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FLIGHT

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The New Atlantic Pact

THE news that the NATO Armaments Committee has chosen the Bréguet 1150 maritime reconnaissance and anti-submarine aircraft to succeed the Lockheed Neptune in NATO air forces has a manifold significance. The 1150—now called the Atlantic—is based on a specification originated at SHAPE and to which twenty-five companies and consortia, some wholly or partly British, submitted tenders. It is natural, therefore, to enquire how Britain has fared in the selection of this militarily and industrially important new aeroplane.

The airframe (which in an aircraft of this class represents a relatively small proportion of the technical effort and capital outlay) will be apportioned between Bréguet and Sud in France (Bréguet building the centre and forward fuselage, undercarriage and other components, and Sud the outer wings); Dornier in Germany (rear fuselage and tail); Fokker in Holland (centre wing and nacelles); and a new Belgian group, working with Bréguet on the components named for that company. (The Belgian group, called ABAP, embodies Avions Fairey, SABCA and FN interests.)

Britain's contribution is the highly satisfying one of Rolls-Royce Tyne turboprops (advanced Tyne 20s, delivering over 6,000 e.h.p.); de Havilland propellers; engine accessories; and a significant part of the operational equipment. The choice of the Tyne is especially gratifying because it is added proof that this peerless turboprop—unrivalled indeed, with the recent demise of the Allison T61—will establish itself in global service as did the Dart. Already the Tyne has been specified in this country for the Vanguard, Rotodyne and certain developments of the Argosy; on the Continent for the Franco-German Transall; and in Canada for the CL-44.

Technical Considerations

The technical implications of the Atlantic order call for further comment, and this must be prefaced by reference to present maritime equipment. In succession to her own Neptunes America is ordering several hundred Lockheed P3Vs—a development of the Electra transport, retaining the Allison turboprops. Canada has chosen the Argus—a redesigned Britannia with piston engines; and Great Britain has the Shackleton, likewise piston-engined. Technically, then, it emerges that the turboprop has conquered the last stronghold of the big reciprocating powerplant.

Operationally the Atlantic order is of particular interest when related to a recent pronouncement by Sir Dermot Boyle. Writing in *Air Power*—evidently while he still held his post as Chief of the Air Staff—Sir Dermot remarked that in the Shackleton 3 we had one of the finest maritime aircraft in the world, and it would continue with us for the best part of ten years. It might well be, he added, that the size or complexity of any new submarine-detection equipment would demand a larger aircraft, or one of more revolutionary design. But until this requirement was clear Britain's maritime air forces would continue with their Shackletons.

Sir Dermot also made allusion to new detection equipment for the Shackleton, and it seems clear that this type is with Coastal Command to stay, notwithstanding SHAPE's and NATO's own ideas and policies. Our Belgian contemporary *AiRevue* nevertheless considers that "English interest" in the Atlantic "might materialize." If this should come to pass our national pride would have no cause for injury over a foreign aircraft that is so eminently British.

PUBLIC DEBUT as chairman of the Blackburn Group was made by Arthur F. Jopling when he spoke at the 29th annual prize ceremony for Brough apprentices, held on January 18 at the Guildhall, Kingston upon Hull

FROM ALL QUARTERS

IAS Honours E. T. Jones

AT the annual Honors Night Dinner of the Institute of the Aeronautical Sciences in New York on January 26, honorary fellowship of the Institute was being conferred on E. T. Jones, Deputy Controller (overseas affairs) at the Ministry of Aviation, and on Elmer A. Sperry Jr. Among other presentations were the Louis W. Hill Space Transportation Award to Dr James A. Van Allen of the State University of Iowa, for the discovery of the Van Allen radiation belts; the John Jeffries Award for outstanding medical research to Brig-Gen Don D. Flickinger; the Robert M. Losey Award for meteorological research to Dr Herbert Riehl of Chicago University; the Sylvanus Albert Reed Award for achievement in aeronautics to Karel J. Bossart of Convair for his major role in the development of the Atlas ICBM; and the Lawrence Sperry Award to Dr James E. McCune of Aeronautical Research Associates of Princeton.

TECHNICAL EVALUATION tests have recently been under way with these Gyrodyne YRON-1 helicopters, which are capable of carrying a 250lb load and have a top speed of 70 m.p.h.

Bréguet 1150 Atlantic

EDITORIAL comment is made in this issue on the choice by the NATO Armaments Committee of the Bréguet 1150 Atlantic as a replacement for the Lockheed P2V Neptune, used by several member-nations for ASW and maritime reconnaissance. It is appropriate here to examine the design of the Atlantic, insofar as security permits.

With the Canadair Argus, the RCAF took a pressurized turboprop aircraft and, in adapting it for ocean patrol, changed it to an unpressurized machine with piston engines. The US Navy, however, have adhered to a pressurized turboprop with the Lockheed P3V (Electra), and the same formula is followed with the Atlantic. Powerplants are two Rolls-Royce Tyne 20s, each rated at over 6,000 e.h.p. and driving de Havilland four-blade propellers. The fuselage is of double-bubble section. The wing has high efficiency which, taken in conjunction with the great internal fuel capacity and outstanding economy of the engines, should result in very great range and endurance. During ferry missions, or in transit from base to a patrol area, the Atlantic will cruise at high altitude for best economy, at approximately 300kt. Maximum endurance will be over 20hr, and the type is potentially capable of breaking the world's current long-distance record (held by an early P2V).

Weapons bays in the lower bubble accommodate a wide range of stores, and provision is also likely to be made for underwing pylons. Electronic equipment, partly from the USA and Great Britain, will be exceptionally advanced and comprehensive. Visual-search ability has clearly been subordinated to the performance of more advanced weapon-system methods, although there are bulged look-out windows in the rear fuselage. The operating crew will be nine or ten, and the interior should be more spacious and comfortable than that of any comparable aircraft.

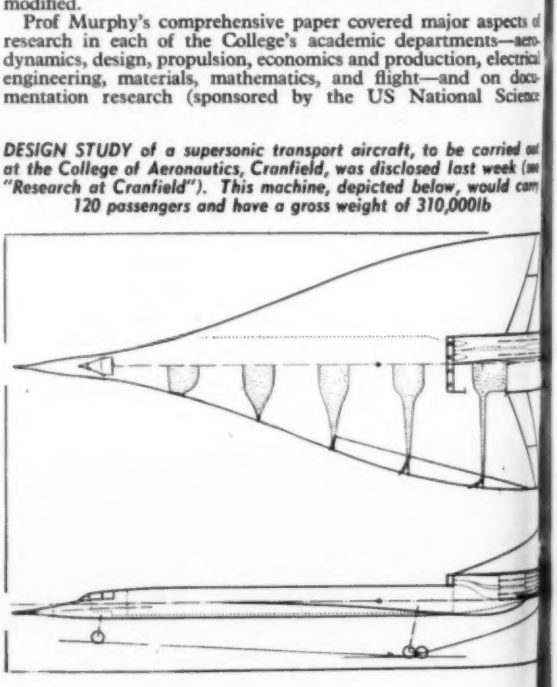
Construction of the batch of development aircraft is "proceeding very satisfactorily," and NATO member-nations are likely to be invited to state the number of Atlantics which they will wish to operate, in order to facilitate future production planning. Atlantic airframes are being constructed by a four-nation consortium. The first off the line is to fly in November next year and the Atlantic should be cleared for initial operations in under three years' time. Already production of "several hundred" can be predicted with confidence.

Research at Cranfield

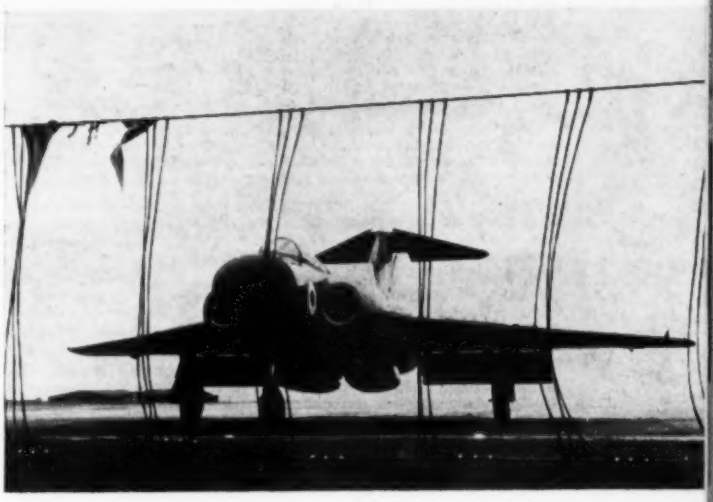
THE Short Sherpa is to recommence flying at the College of Aeronautics, Cranfield, in a flight-test programme to investigate rolling response with all-moving wingtips. This news was contained in an RAeS lecture on *Research at Cranfield* delivered at Cambridge by Prof A. J. Murphy, principal of the College, on January 21. The Sherpa programme was interrupted two years ago following an engine failure: both Palas units have since been modified.

Prof Murphy's comprehensive paper covered major aspects of research in each of the College's academic departments—aerodynamics, design, propulsion, economics and production, electrical engineering, materials, mathematics, and flight—and on documentation research (sponsored by the US National Science

DESIGN STUDY of a supersonic transport aircraft, to be carried out at the College of Aeronautics, Cranfield, was disclosed last week (see "Research at Cranfield"). This machine, depicted below, would carry 120 passengers and have a gross weight of 310,000lb



***LONGSTOP**: Safeland safety barriers are now installed at a number of RAF airfields at home and overseas. This one—seen with a Javelin of No 85 Sqn—is at West Malling*



Foundation) in the College library. One of the illustrations to the paper, reproduced opposite, showed a supersonic aircraft under consideration for detailed design study in the 1960-61 session by second-year students of the Department of Aircraft Design.

US Defence Budget

LAST month President Eisenhower asked Congress to pass a Fiscal 1961 budget of $79.8 billion ($10^9$), of which approximately $41 billion are earmarked for the Defense Department. Substantially the same as last year, this total will maintain defence spending at a fractionally higher level, although a lower proportion of the total will go for research and development. Potted data include (billions of dollars): aircraft procurement, 4.753 (last year, 6.143); missile procurement, 3.825 (3.244); research, development, test and evaluation, 3.91 (4.189); operation and maintenance, 10.527 (10.317); and military construction, 1.188 (1.364). The budget submitted for NASA is $802m; this sum will be discussed in "Missiles and Spaceflight" next week.

Assisting Initiative

A RESEARCH assistant in the Department of Flight at the College of Aeronautics, Cranfield, David Hyde, has won the 1959 John de Havilland Award. The value of this is £400 and the winner, who is 22, plans to use it to finance a 35,000-mile tour (29,000 miles overland) of Africa and North and South America, starting in mid-March. He will be accompanied by two companions, an Australian and a Canadian, and is to study airline operation in primitive and isolated areas and conduct market surveys. Under the terms of the award, he is to make a monthly report on progress, and finally make a full report on what he has done and the experience he has gained. The John de Havilland Scholarship Fund, in memory of Sir Geoffrey and Lady de Havilland's third son (killed in a flying accident in 1943), has been administered by the SBAC since 1948. Until last year, it was used to give financial help to boys wishing to take up an apprenticeship in the aircraft industry; but now this new form of award has been devised, emphasizing the spirit of adventure and use of initiative and resource.

Dutch Transonic Tunnel

FOUNDED in 1919, the Dutch international aviation research institute (Nationaal Luchtvaart-Laboratorium) can claim to be the oldest such institute in Europe. They recently opened a transonic tunnel, which is their largest single tool. Four 5,000 h.p. electric motors drive a four-stage compressor, the 22 rotor blades of each stage having variable pitch in order to produce a range of tunnel speeds at essentially constant r.p.m. The institute generates its own electric power, using steam plant from scrap escort vessels.

Working-section dimensions are 80in × 64in; Mach limits are 0 to 1.3 and stagnation pressure is variable between 0.125 and 4atm. To bring the tunnel quickly up to high pressures, air is fed from an 847,550 cu ft bottle storing at up to 40atm. Instrumentation includes strain-gauges, liquid manometers and Schlieren and shadowgraph systems. The institute is developing its own automatic pressure-measuring system, with pressure transducers feeding a computer.

The tunnel is being made available to all Continental aircraft manufacturers. In 1955 a contract for its use was signed by Association Internationale des Constructeurs de Matériel Aéronautique, and a number of the association's members have already submitted requests for time to be allotted to them.

***NEPTUNE-REPLACEMENT**: As noted opposite, Bréguet's 1150 Atlantic has been adopted as the standard NATO ocean-patrol aeroplane. We present here a manufacturer's sketch, from which we have prepared the accompanying three-view drawing*

Airwork Acquire Bristow

AIRWORK, the British independent airline group, have acquired the entire share capital of Bristow Helicopters Ltd. The Bristow helicopters (ten Whirlwinds, six Widgeons, seven Bell 47G-2s and one Alouette) and its two fixed-wing aircraft (a Beaver and an F.50 Twin Bonanza) will continue to operate on various current overseas contracts. Alan Bristow is to remain chairman and managing director and his co-directors will now be M. D. N. Wyatt, chairman and managing director of Airwork; F. A. Laker, chairman and managing director of Air Charter; and G. Russell-Fry, A. G. Green and J. N. Woolley, all formerly directors of Bristow helicopters. Because of the steadily growing use made of its London Heliport services, the Bristow fleet is to move its base of operations from the West of England to Redhill Aerodrome early in March.

IN BRIEF

Scott Crossfield flew a North American X-15 under power for nine minutes on January 23. Maximum Mach number reached was approximately 2.3.

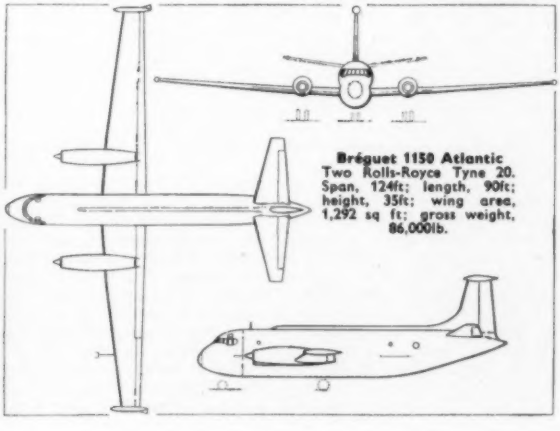
Nineteen Short Seamews, which have been in storage at RNAS Lossiemouth for the past two years, are to be sold by the Admiralty.

E. W. Percival has ceased to be a director of Lancashire Aircraft Co Ltd and now no longer has any connection with that company or with the Prospector aircraft manufactured by it.

The first BEA office on the American Pacific Coast was opened in Los Angeles by Lord Douglas on January 25. Accompanied by Lady Douglas, BEA's chairman is at present visiting the American West Coast manufacturers.

The Directorate of Flight Safety has stated that RAF fatality rates for 1959 were only a quarter of those in 1950 when the Air Force was converting almost entirely to jet bombers and fighters. Last year there were 31 fatal accidents in which 56 people were killed, compared with 120 fatal accidents in 1950 when 242 people were killed.

"Flight" drawing


Bréguet 1150 Atlantic
Two Rolls-Royce Tyne 20.
Span, 124ft; length, 90ft; height, 35ft; wing area, 1,292 sq ft; gross weight, 86,000lb.

FROM ALL QUARTERS . . .

While the Grumman WF-2 Tracer AEW derivative of the Tracker enters US Navy carrier service, Grumman are delivering S2F Trackers to the Italian and Dutch navies under a $16.2m MWDP contract.

Grumman have received a $1.5m contract from the US Maritime Administration for the design and construction of an open-sea hydrofoil craft. The vessel will weigh 80 short tons and will achieve up to 80kt on the power of "a gas-turbine aircraft-type engine."

A dinner for former members of No 8 Course (1949) at the Empire Test Pilots' School is being held at the Old Manor, Bracknell, Berks, next Saturday, February 6. The organizer is Wg Cdr A. Woodcock, Wing Commander Flying at RAF Wattisham.

An agreement has been signed between Doman and Ing. A. Ambrosini by which the Sicilian company Aeronautica Sicula (Aerosicula) is to build 25 Doman IZ-5 helicopters under licence for the American market. A further order for 30 IZ-5s, for Naval use, was expected to follow in a matter of days.

Following the first production order for 100 Mirage IIIs placed last year, the French air force is reported to have ordered a further 340 ground-attack versions of the Mirage III and 30 Mirage IIIB two-seaters. The total orders should be completed during 1965.

Sir George Dowty, chairman and managing director of the Dowty Group, is to open the 9th National Power Farming Conference being held at Cheltenham from February 9 to 11. The conference is organized by our associated journals *Practical Power Farming* and *Farmer and Stock-Breeder*.

Esmonde Grattan Thompson, who helped to invent the Frazer-Nash revolving turret gun for the RAF, died at Menton on the French Riviera, on January 19, at the age of 73.

A spokesman for the Dutch Embassy in Bonn said on January 19 that Holland and Western Germany had reached agreement on the joint production of the F-104G Starfighter. Basic agreement had also been reached on technical training, maintenance and repair.

A new Bell helicopter, the 47J-2 Ranger, was shown publicly for the first time at the recent Helicopter Association of America convention at Anaheim, Cal. Powered by a Lycoming VO-540, the Ranger is said to have an absolute ceiling—at its gross weight of 2,850lb—of 13,600ft and a service ceiling of 12,100ft.

We regret to record that Air Cdre J. S. Chick, MC, AFC, RAF(Ret), died in hospital at Colchester on January 20 at the age of 62. He won the MC while serving with No 11 Sqn in the RFC and received his AFC in 1926. He was a test pilot at RAE Farnborough in the early 1920s and one of the first commanders of the RAF high speed flight at Felixstowe.

R. E. Harvey, deputy managing director and general manager of Short Brothers & Harland Ltd, said last week that there was reason to believe that from the end of 1960 the company could look forward to a period of prosperity extending over several years. He added: "We feel that the potential markets for the Britannic strategic freighter, the SC.7 light freighter and the Seacat guided missile give a solid basis for our optimism."

The New Look for Engines

By FRANK BESWICK

THE most significant thing about Mr Sandys' new look for the aircraft industry is that so much remains as it was. Now that individuals responsible for the running of the industry have been able to leave Whitehall and the City and get back to their desks, they find almost everything unchanged—the same faces, the same factories and the same problems on the shop floor. Not, of course, that the epidemic of mergeritis left everyone completely unmoved. Occasionally, irritation was marked; as one person concerned put it, "It is just the good old British objection to being pushed around."

Nevertheless, for all the apparent success of Phase I of Mr Sandys' operation, the fact remains that the real problems lie ahead.

Financial agreements have been reached at the top, but human beings a little lower down have still to come to terms. Mergers are announced, but there are still the same square feet of factory space in the same dispersed areas throughout the country. Though everyone has spoken of the necessity for contraction, there are the same number of employees now as there were before the Minister's influence was felt—and they all look hopefully for work.

Apart from the charge of acting precipitately (and Ministers traditionally are guilty of either doing nothing or of being hasty), Mr Sandys can be criticized for starting his reorganization at the wrong end. Some would say that the first task was to get a proper appreciation of the technical resources available, and to reconstruct, or redeploy, on the basis of the technical or physical facts of the situation. A ministerial answer to this might well be that the changes of strategy having been made at political instigation, the consequential tactics can be left for those directly concerned to work out at greater leisure. Or, as someone less delicately phrased it, the prima donnas can be left to fight it out among themselves.

And how does the picture look since the first of these articles appeared just over one month ago?

Mr Mensforth can still claim that Westland Aircraft have preserved the specialist character of their operations, although Bristol's helicopter interests are now added to their responsibilities. Sir Frederick Handley Page still maintains his sturdy independence; and many will wonder how the company which has produced the outstanding Victor and is in the forefront in laminar-flow developments will be fitted-in to the Minister's scheme of things.

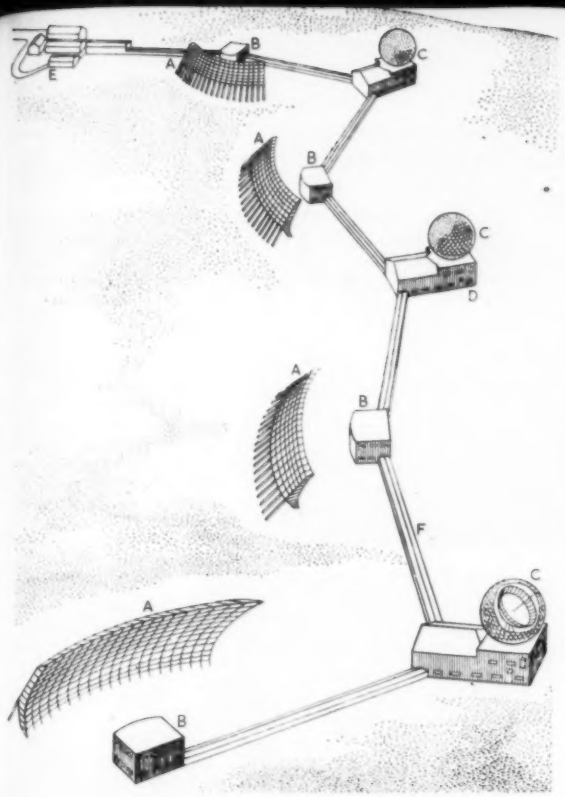
The sector of the industry least affected by recent events is the aero-engine side. Accounting, as they did in 1958, for nearly one-third of the industry's total export trade, it is reasonable to ask whether contraction is a word which applies to them at all. No doubt there will be difficulties during this transitional period, but nowhere does one find more quiet optimism; and if we cannot maintain our place in this field of advanced engineering, then there cannot be much future for the country at all. And since there is no defeatism about the prospects of Britain in general, then the longer-term outlook for aero-engines is bright.

It is over the next few critical years that doubts arise, and Mr Sandys' forthcoming statement will disappoint if it does not deal with that. The main centres of the engine industry now seem established. Apparently aloof from the bargaining of recent weeks, Rolls-Royce proceed serenely upon their way. To them the problem is fairly simple. Developing major aero-engines is an art so esoteric and expensive that few—if any—other countries outside the USA or the USSR are likely to be able to stand the pace. Engine production is a different question, and one of the most interesting and significant features of this matter is the licensing arrangements made by the companies in this country with associates abroad. In their network of overseas licensing agreements, Rolls-Royce appear to have developed a technique as skilled and carefully engineered as the products of their own factories. It is possible to claim that the process of rationalization now working through Britain's airframe manufacturing industry has been to a very considerable extent quietly and competently dealt with already, on an international scale, on the aero-engine side. There are other nations who keep a nucleus of engineers to enable their country to form a judgment on the products offered to them by others. But in the main it seems fair to say that the cost of the enormous engine-development facilities in this country and the USA must be spread indirectly over the rest of the Western world; and supporting the research and development overheads is surely the prime objective of all present planning.

The second major British engine undertaking, Bristol Siddeley, can also count themselves fortunate in that the union which brought them into existence took place before the high fever of mergeritis overtook the industry. The bringing together of Bristol and Hawker Siddeley engine interests was a rational operation, and the pieces fitted together. It is true that both the original parents have since undergone changes themselves, and each is now in some relation with other engine interests. If extreme tidiness is what Mr Sandys is after, then there is a case for Bristol Siddeley extending to take over other enterprises. The snag here, as with the rest of the industry, is that enlarging the number of factories under one's control does not necessarily increase the order book. The Hawker Siddeley merger doubled the size of previous units, and the resultant organization is the better for it; but increasing again would not necessarily bring similar benefits.

One other point about the engine industry which will require a nice judgment in the future concerns the pooling, or at least the exchange, of information between the two major concerns in the business. No one would favour monopoly. Yet in this comparatively small country, which has not an unlimited amount to spend on research, we cannot afford the penalty which might be imposed if important knowledge were to be restricted to half the industry. Given the goodwill which does exist, a proper balance in this matter ought not to be beyond achievement.

What about Parliament in all this? After Mr Sandys makes his statement there will doubtless be debate. It seems possible that the principal point at issue will be that of public funds going to private firms. Some of the industry's leaders whom I have interviewed consider this traditional problem fairly simple of solution. But finding the perfect formula is likely to provoke discussion long after the most abstruse technical difficulties have been overcome.



As noted on this page, a BMEWS installation is to be constructed in England. This sketch (based on the BMEWS at Thule) depicts: A, detection-radar aerials, each 165ft high and 400ft long; B, buildings housing organ-pipe scanners; C, tracking radars; D, trajectory computers installed in central transmitter building; E, living quarters and workshop; F, covered road for maintenance vehicles

Missiles and Spaceflight

THE FIRST BRITISH SATELLITE

Details of the scientific equipment to be carried in the first British satellite, to be launched by means of a US Scout solid-fuel rocket in some eighteen months' time, were expected to be announced following the return of Prof H. S. W. Massey from the USA on Wednesday of this week. In addition to the news of the experiments, it was believed that an exhibition of actual hardware, similar to that organized by Britain at the recent COSPAR meeting in Nice, was to be staged by the Royal Society.

It will come as no surprise that the sponsors of the chosen experiments are among those who have acquired previous experience in the Skylark sounding-rocket programme. Of the investigations proposed by the British National Committee on Space Research, four were approved for this first satellite by the Government's advisory steering group. It is unofficially reported that these comprise one radiation, one cosmic-ray and two ionospheric experiments, in which case one would expect the groups involved to be University College, London (radiation and ionospheric), Imperial College, London (cosmic rays), and Birmingham University (ionospheric).

In the time between now and the planned date at which Scout will be available for the satellite launch, from either Wallops Island or Vandenberg, the British equipment will be subjected to a comprehensive testing programme. This will include firings in Skylark and (on a space-available basis) Black Knight rockets.

MISS SAM RIDES MERCURY CAPSULE

In a test of the Project Mercury emergency escape system on January 21 from Wallops Island, Virginia, a 7½lb female monkey successfully survived a highly accelerated flight to 48,900ft and a parachute descent into the Atlantic. The monkey was carried in a 125lb instrumented "biopack" cylinder inside a fullscale replica of a Mercury capsule (photographs overleaf).

The capsule was launched by a Little Joe booster to a height of 36,500ft, when the escape rocket fired, separating the capsule from the booster and accelerating the former to 2,100ft/sec and a height of 48,900ft. A number of parachutes were used to retard the capsule on the way down, with the main parachute opening at 10,000ft. Air pressure on the capsule at the instant of firing the escape rocket was said to be 1,000lb/sq in, and the monkey (named Miss Sam) was said to have been subjected to 20g.

After coming down in the Atlantic some 12 miles offshore the one-ton capsule was recovered by helicopter. The monkey was reported to be in good physical condition.

THOR: REVISED VERSION

Improvements are currently being made to the effectiveness of the Thor IRBM, a weapon which resulted from a crash programme to produce a workable system at the earliest possible date. Although Douglas Aircraft have been undertaking research into hard emplacements and two-stage Thors, most of the work is centred upon less fundamental modifications. Missile 256 (see photograph below) incorporated an improved powerplant and new nosecone. No details of the former are available but it appears to have been merely a minor modification of the MB-3, raising the thrust at sea level from 150,000 to 165,000lb. The ablative nosecone is lighter, and impacts much faster, than the heavy heat-sink pattern originally used.

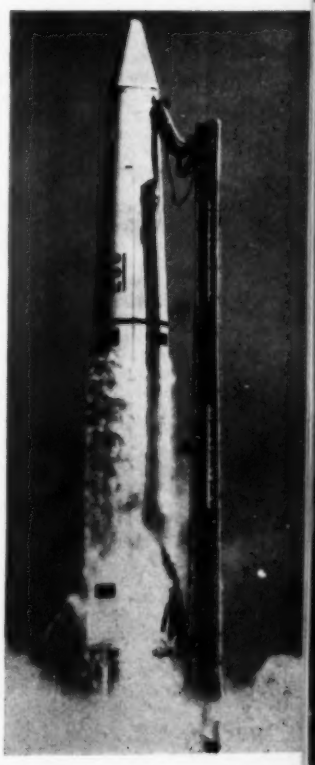
BALLISTIC MISSILE WARNING IN ENGLAND

During the past three years the USA has greatly accelerated her efforts aimed at increasing the minimum warning-time of impending ballistic-missile attack on the United States. Under the general direction of the US Air Force, a ballistic-missile early-warning system (BMEWS) has been designed and two installations are in hand. Approval has now come for a third station, to be located in England. Prime contractor for BMEWS is RCA; the associated surveillance radars are the responsibility of General Electric, who have sub-contracted design and construction of the enormous aerials to D. S. Kennedy & Co.

The heading sketch on this page gives an approximate indication of the layout of a BMEWS installation. Dominating the site are the detection radars, each of which consists essentially of an organ-pipe scanner and a parabolic reflector. Operating in the UHF region, these radars are many times more powerful than any previously seen, having a mean power of around 1MW and a peak power ten times as great. Each radar will employ split beams, each one degree in width and offset slightly in azimuth, which will be rapidly swept horizontally. The return signal sent back from an incoming nosecone may then give all the information needed by a computer for the rough determination of the target's trajectory. These giant radars will each have a range of some 2,800 miles, and will scan a fixed segment of airspace in the direction of the Soviet Union.

From the detection radars signals will be passed to the tracking radars, which will be trained on the incoming nosecone as a result of the already approximately computed trajectory. They will thereafter follow the target precisely, in order to ascertain its identity beyond doubt and to establish its impact point with a high order of accuracy. These tracking radars will each have an advanced scanning system, protected against violent weather by a slightly pressurized spherical radome 140ft in diameter.

Overall cost of a BMEWS installation naturally varies greatly according to the location of the site, its remoteness and the adversity of the terrain. At one time it was feared that costs could amount to $720m per site, but the latest estimates from Washington suggests that the aggregate costs of the first two installations will be approximately $400m. These installations are on the island of Shemya, Alaska, and at Thule, Greenland. Both these installations are nearing the operational stage, and their cost has been inflated by the necessity of providing living quarters which are virtually environment-free, and in providing



Thor No. 256 was fired down the Atlantic Missile Range on January 14. Distinguished by its Jupiter-like ablative nosecone, it also incorporated a more powerful engine, which will be used in future Thor-Able and Thor-Delta space boosters (see news item above)

A quick trip from Wallops: departure and return of rhesus monkey Miss Sam from Wallops Island, Virginia, on January 21 (see news item on previous page). Launch was by Little Joe rocket; return by Marine Corps HUS-2 helicopter after capsule recovery 12 miles offshore. Below, Miss Sam is extracted from her "bio-pack" container by USAF School of Aviation Medicine personnel after the flight

Missiles and Spaceflight . . .

power supplies from scratch (at Thule a permanently moored US Navy ship provides 34,500kW).

As originally conceived, the third installation was to have been located either in Iceland or near Prestwick, Ayrshire. Last year rumours suggested north-eastern Scotland, but the latest hearsay is that the most detailed survey favours a site on Fylingdale Moor, Yorks. The Ministry of Defence confirmed last week that the technical feasibility of an English BMEWS installation had been agreed, but suggested "it is as yet far too early to say what is the choice of site or to give any indication of costs, or of cost-sharing, if any."

Undoubtedly the weakest link in the present BMEWS set-up is that each station is predicated on the assumption that Russian missiles will arrive from a previously known point of the compass (within about 30 deg). The implications of the addition of a third stage to the Soviet rocket fired on January 20 (see following news item) make this assumption no longer valid. A missile with a range of about 12,200 miles could hit any point on Earth from any other point and could arrive from any direction. To guard against such a contingency each BMEWS installation would have to be extended by a factor of about three.

RUSSIA SPLASHES No 1

On January 21 Tass, the Soviet Union's official news agency, announced: "A ballistic multi-stage rocket was launched in the Soviet Union to the Pacific on Wednesday, January 20. It was the first in the series of planned launchings under the programme of producing a more powerful ballistic multi-stage rocket for orbiting heavy Earth satellites and for realizing spaceflight towards the planets of the solar system." The statement said that the missile reached a speed greater than 26,000km/hr (16,156 m.p.h.), that the nosecone was tracked by radar, optical and acoustic installations until it reached the sea, that the flight of the rocket and the functioning of all its stages corresponded with the programme laid down, that the second stage burnt up during re-entry and that the impact took place about 12,500km (7,767 miles) from the launching point, within 2km (1.24 miles) of the target point. Apogee was about 764 miles.

Undoubtedly this mission was flown by a large ballistic system which, although probably primarily produced for military purposes, should prove well suited to space research (especially manned space research). In the latter roles the two existing stages would carry a third, powered, stage; on the January 20 flight the third stage was not powered, but probably contained a simulated warhead. Tass stated that the nosecone was "observed in flight" and that Russian naval vessels made "valuable measurements of the lower part of the trajectory." Re-entry velocity was greater than that for any previous missile. The Russians did not indicate whether or not the nosecone was recovered; at least one ship is said to have carried recovery gear.

Bearing in mind the number of variables involved in missions of this nature—imperfect geodesic knowledge, mechanical inaccuracies in the launch, guidance, control and propulsion systems, inaccurate mapping, errors in navigation by the observers near the impact point and random variation introduced during the climb through the atmosphere and re-entry—it is most unlikely that accuracy of a higher order than "2km" will ever be achieved over such a range, except by sheer luck. For military purposes such accuracy is more than sufficient; and for spaceflight it implies that the Soviet Union can achieve repeatable performance, and that Lunik 2 (which actually demonstrated rather lower accuracy) was no chance shot. For comparison, the USAF Atlas has since September been consistently impacting within about 2 miles of the designated point over ranges of around 6,300 miles (still using the original radio-inertial system on most flights).

The demonstrated range of this Russian vehicle would undoubtedly be increased to something like 12,000 miles by the addition of even a small amount of propulsion in the third stage. The implications of this are noted in the discussion on BMEWS in the preceding news item.

AUSTRALIAN SPACE EFFORT

At least one satellite due to be launched by Scout rocket in about 18 months' time will carry scientific equipment designed and built in Australia. This was stated recently by Dr A. F. Martyn, chairman of the Australian National Committee for Space Research, who added that this launching would be from a site in the USA. Subject to Australian Government approval, he said, a series of sounding-rocket launches from Woomera could be inaugurated in the near future. For the initial stages of this proposed programme Skylark and/or Long Tom rockets might be used, followed by more powerful rockets "by arrangement with other Commonwealth countries."

As an interim project pending the development of the nuclear-ramjet SLAM (supersonic low-altitude missile), the USAF is investigating CLAM (chemical low-altitude missile). While not rivalling SLAM in ultimate range, CLAM will cruise at comparable speed over "intercontinental" range at below 1,000ft altitude.

The XGAM-87A ALBM being developed for USAF Strategic Air Command by Douglas Aircraft has been named Skybolt. The USAF Chief of Staff, Gen Thomas D. White, said last week that the missile will give America an essentially invulnerable weapon against surprise attack, and that it would offer "the most mobile striking power ever achieved."

Lt-Gen Bernard Schriever, commanding general of the USAF Air Research and Development Command, said in Washington recently that he did not believe present warning networks for North America were "quite good enough to meet the threat of a possibly decisive surprise attack." It was his belief that the system would be adequate only when it included an operational communications satellite.

FLIGHT SYSTEM SURVEY

Weather Radar is Compulsory

THE American Federal Aviation Agency proposed last July to make weather radar in working order mandatory on all passenger-carrying American transport aircraft within six months. Immediate strong protests followed from ATA, particularly concerning the short time allowed for installation and the doubtful usefulness of the equipment because some types of dangerous weather conditions could not be detected by such radar. Hawaii and Alaska were noted to be very little affected by thunderstorm weather and operators complained of the great financial burden involved, both in procuring and installing the equipment.

The result has been a considerably modified regulation which states that all pure jet and turboprop airliners used in passenger services are to be fitted with weather radar by July 1 this year. Douglas DC-6 and 7 and Lockheed 1049 and 1649 Constellations must be equipped by January 1, 1961. All other affected transport category aircraft must be fitted by January 1, 1962. The rule does not apply to the Curtiss C-46, which was cleared for civil operation under different rules, or to the DC-3 and Lockheed Lodestar. Neither will it greatly affect the new jet and turboprop transports in which provision for radar is made as a matter of course and most of which are already so equipped. Aircraft operated solely in Alaska or Hawaii are exempted because dangerous weather detectable by radar rarely occurs in these areas. Helicopters are at present excluded, as well as aircraft used for cargo, testing, training or ferry flights.

Operators must submit to the FAA a schedule for the installation of weather radar so arranged that at least 40 per cent of the installations shall be complete a given number of months before the final date. They must also give notice of any aircraft which will no longer be used for passenger transport after the final date.

From March 31 this year, no aircraft fitted with weather radar must be dispatched under IFR or night VFR conditions when weather reports indicate a likelihood of dangerous weather unless the radar equipment is in working order. If the radar fails during a flight in such conditions the aircraft must be flown in accordance with operating manual instructions for such a contingency; and the operating manuals must be modified and approved by FAA to cover this case.

A technical service order was issued last December 1 giving new minimum performance standards for weather radar. Any equipment approved before that date will be acceptable for operation under the new order.

This new group of regulations is another example of the FAA's purposeful approach to air safety. Although it has shown considerable regard for operators' objections to the original wording, the main objective seems to have been achieved. Statistics had shown that a significant number of accidents could have been avoided if weather radar had been working. All United Airlines aircraft have for some time been equipped with weather radar and the airline claim they have suffered virtually no damage from such weather since then. The measure of the financial burden imposed on airlines, and particularly its effect on the smaller operators, has yet to be seen.

Radar Recording

THE A.E.I. Electronic Apparatus Division is producing radar recording and play-back equipment applicable to training or research in traffic control. The equipment may be used to record a sequence of actual traffic movement which can then be played back to analyse the traffic flow around an airport. If required, synthetic targets may then be introduced in order to try out alternative control methods and situations. The tape remains as a permanent record; and the related R/T conversations may also be recorded on another unit housed within the equipment.

Conversely, an unlimited number of synthetic targets can be recorded and superimposed on a raw radar picture for future study. The infinite number of targets can be achieved by recording, say, 12 simulated targets and then turning back the recorder and repeating the process until the required number of targets has been obtained. Raw radar may first be recorded to form a background for the simulated targets. Characteristic presentations at specific sites can be recorded with a mobile equipment and taken back to headquarters for detailed study so that both investigation and training can be carried out at a central location.

Another Doppler Order

THE South American airline VARIG have ordered a number of CMA-623 Doppler radars from the Canadian Marconi Co. The equipment, which will be in Arinc form, is to be installed in the Boeing 707s which VARIG will put into service during the summer. The CMA-623 has already completed more than 2,000hr flying in Boeing 707s, particularly with Qantas and PanAm, and its good performance in service was reported on January 15.

Decca Radar Training

A RADAR training school is to be established by Decca Radar Ltd at their recently acquired site at Cowes Airport, Isle of Wight. This is in addition to the manufacturing organization for which the company originally bought the airfield. The school, to be completed in the spring, will provide technical radar training for the engineering personnel of those overseas governments and authorities who are installing major civil and military radar systems manufactured by Decca. Comprehensive courses lasting eight to ten months will be given, as well as shorter courses of about six weeks for service engineers. The company already operates a technical training unit at its service headquarters in London and a separate marine operational school at Blackfriars Pier on the Thames. The new school is being built to meet the heavy demand for training facilities following recent increased sales of large radar systems overseas.

W.S. Electronics Orders

A SWISS order worth about 1m Swiss francs has been placed for airborne VHF communications transmitter/receivers with W.S. Electronics Ltd, a wholly owned subsidiary of K.G. (Holdings) Ltd. Pilot orders have been received from Italy and France.

An unnamed British aircraft company has placed a £40,000 order for the W.S. Electronics VHF telemetry transmitters which were first exhibited during the SBAC display last year. The equipment transmits 12 separate channels of intelligence on a single frequency.

Above and below are the control panel and indicator of the latest version of the Computing Devices of Canada Position and Homing Indicator which is to be fitted in German and Canadian F-104s and many of the Fiat G.91 versions. The package of push-button-selected destinations can be set up before flight and plugged in by the pilot. He can carry several packages to cover a greater number of destinations or reference points. Details of the various installations were given on this page in our issue of November 13 last

Rationalization Reappraised

A CONTRIBUTION TO CONTROVERSY

By M. J. HARDY

THERE will be little unanimity of opinion respecting this contribution. But these are contentious times, and the author makes his case with skill and ardour, if not always with unassailable reasoning. It was written shortly before the Vickers/English Electric/Bristol merger.

ON December 2, 1957, Aubrey Jones, then Minister of Supply, outlined to the House of Commons the Government's policy of rationalizing the British aircraft industry. For two years now the doctrine of rationalization has hung like a black thundercloud over the industry's hopes and prospects, and it is particularly appropriate, in view of the recent Hawker Siddeley/de Havilland merger and the Minister of Aviation's desire for mergers among the independents, to examine what rationalization has done for the industry, what it has failed to do and its essentially political, as distinct from commercial, character.

"It is desirable," said Mr Jones on that fateful December day two years ago, "that the aircraft industry should reshape itself into stronger units. I have accordingly intimated to the industry that in placing orders for further requirements the Government will be influenced not only by the quality of design but also by the resources, technical and financial, available to complete the project quickly and successfully; and that, in so far as these criteria are not met in isolation, the Government will require the chosen contractor to work in association with one or more other contractors."

And in the words of Lord Mancroft, Minister without Portfolio, "To remain fully efficient, the industry would have to reorganize itself into a relatively small number of more compact and more powerful groups." Benjamin Disraeli was so right when he observed that England, a land subject to fogs and governed by a powerful middle class, demanded grave statesmen. But the gravity and solemnity which surrounded rationalization like a cloak served as an excellent disguise for the two major fallacies on which it was based: that size is synonymous with efficiency, and that new orders can be attracted to the industry merely by increasing the size of individual units by enforced amalgamation. Can it honestly be said that a single British aircraft or aero-engine has been sold abroad as a result of rationalization, because a customer had more confidence in a consortium or group than in an individual firm?

Where it Began

Undoubtedly a powerful factor behind the rationalization doctrine was the size of the US West Coast giants, Douglas, Convair, Boeing and Lockheed. Somebody, it appeared, suddenly stumbled across the fact that these firms were very big and did a lot of business, and promptly concluded that if the British aircraft industry was reshaped into a few similarly colossal concerns it would do a similar amount of business. This facile solution, quite childlike in its naïveté, completely ignored the fact that the size of an industry grows or dwindles with the amount of business it does—not *vice versa*. The amount of that business is related to the size of the markets, and here the Americans have an overwhelming advantage because of the size of their home markets, both civil and military.

Much less obvious, however, was the fact that the West Coast giants, and other American firms, owe their present size not least to the number of aircraft they supplied to the RAF and other Allied air forces just before and during the war. When the first British air mission to America, under Air Cdre A. T. Harris (later C-in-C of Bomber Command), arrived in April 1938 the American industry was in a worse state of depression than that of this country had been before the rearmament programme got under way. But it was the huge British and French military orders placed before Pearl Harbour that started the US industry growing to its present stature; by December 1940 no fewer than 11,000 aircraft had been ordered by this country (a total that includes certain French contracts taken over after the fall of France) and several factories were built with British money.

But blissfully heedless of any considerations of this kind, the English, with their love of grave statesmen and their tendency to regard them not as ordinary human beings doing a difficult job but more as demi-gods whose utterances have a mystic, oracular significance, began a process of convincing themselves by repetition that rationalization really was the solution. All one had to do, so it seemed, was to take Vickers and de Havilland and Hawker Siddeley and Bristol and Fairey and Handley Page . . . and any others one happened to think of, and "reorganize" them just like a child playing with a pile of toy bricks by the fireside. It all seemed so easy. Too easy, in fact, because the rationalization idea started to snowball, and began to gain such acceptance at Westminster that almost imperceptibly it became an end in itself instead of a means towards an end. .

For all except a devoted handful of Members it was a dreadful bore having to think about and debate all these tiresome aeroplanes and missiles, and the new and plausible doctrine was welcomed because it seemed such a complete and final answer to the problems of British aviation. Like the word "appeasement" in the nineteen-thirties, rationalization has become a kind of spell or incantation invested with magical powers. It formed a comforting mental Maginot Line behind which Ministers and backbenchers alike could protect their ignorance of British aviation and its problems. And it accorded well with those twin elements of faded gentility and unruffled complacency that play so large a part in the mystique of British politics. Few, if any, realized that rationalization was far too inflexible and arbitrary a dogma for such a rapidly developing and quickly expanding field of activity as aviation, and that it was essentially a contractionist, and not an expansionist, philosophy. A great deal was talked and written about making the industry stronger (without any clear definition of the criteria of strength), but nobody, least of all the Government, seemed to have any very clear ideas as to what the industry would do if and when it became stronger.

Wanted—a Lead

In short, there was no official policy for British aviation, and the industry awaited a lead from the Government, which in turn could only suggest rationalization. The British industry's real weakness probably lies in the fact that the Government is its most important customer; and governments, unable to decide what they want from the industry, are given to blaming the latter when they don't get it. In other words, the industry cannot control its own destinies sufficiently; all too often it has to follow when it would like to lead, because Government departments are tending increasingly to usurp the industry's right, and that of its customers, to exercise their own commercial and technical judgment. This was blatantly demonstrated in the case of BEA's medium jet, the D.H.121, over which a fierce political battle raged in January and February 1958: a storm that was in essence the corporation's resistance to Government interference in its re-equipment plans. This interference took the form of a clumsy, graceless and only partially successful attempt to foist rationalization on aircraft manufacturers at the expense of their customers' freedom of choice—an altogether disgraceful episode in the Government's dealings with the industry. It soured relations between the two, and the ill-informed criticisms it provoked must have done an incalculable amount of harm to the prestige of British aviation abroad.

Perhaps even more injury was caused by the continual sick-bed, "Prepare To Meet Thy Doom" atmosphere fostered by Ministerial utterances, particularly Mr Jones's statements about the "inevitability" of contraction. An image was projected to the world of an industry gripped by the negative, defeatist and contractionist philosophy of rationalization while other countries—France and Holland, in particular, as well as the USA—were forging ahead in the race for new markets. Such a picture was scarcely calculated to inspire the confidence of foreign customers, and the loss of such confidence is doubly unfortunate at a time when increasing emphasis must be placed on commercial aircraft. To an industry that has to rely so much on foreign markets for its civil products the confidence engendered by the continuity, tradition and reputation of its famous names is vital.

Unanswered Question

By the time of the General Election it had become increasingly obvious that rationalization was sorely needed—not of the industry but of the Government departments dealing with aviation, since both the Ministry of Supply and the MTCA were too impotent and ineffective to give a clear lead. It was left to Duncan Sandys as Minister of Aviation to make a really effective start on reshaping it; yet, after two years, one very important question still remains unanswered: *what is the Government's policy for British aviation?* Is rationalization still an end in itself or a means to an end? Has Mr Sandys been appointed, as it were, Lord High Executioner of the industry? It could be that those who have the interests of British aviation at heart, and who have been pressing for years for an overall Government aviation policy, have been deluding themselves. Perhaps the intention is that the industry, having been rationalized, can be conveniently forgotten since (according to the theorists) all its problems will then be solved. Perhaps, after all, the same pattern is to continue: rationalization without a policy—as dynamic and useful as a cart without a horse.

If it comes to that, why not rationalize British politics by amalgamating the Tory and Labour parties? Why ever not? The suggestion is not nearly so flippant as it might seem, for to the dispassionate observer it is not the differences between the

Rationalization Reappraised . . .

two major parties that stick out like a sore thumb, but their similarities. The rationalization doctrine differs in degree, rather than in principle, from full-blooded nationalization. The two ideas converge; they are, so to speak, on a collision course. There are not a few Socialists who hold that if Labour abandoned its main thesis of public ownership it would not differ in any important respect from the Conservative Party. "The only conflict," as Aneurin Bevan wrote in *Tribune* recently, "would be about nuances, about semi-tones and half-tints. . . ." And in rationalizing the aircraft industry the Minister of Aviation is, in fact, successfully putting into effect over a very limited field Mr Bevan's doctrine (enunciated at the Labour Party's Blackpool conference last November) that Socialism, in the context of modern society, means the conquest of the commanding heights of the economy. But, it may be asked, how will all this affect the aircraft industry? In this way: in the twilight world of conflicting semi-tones and half-tints foreseen by Socialism, things will be increasingly ordered to suit the convenience of a powerful bureaucracy, made doubly powerful by the knowledge that it will hardly ever be called upon to suffer the consequences of its miscalculations.

Contradiction in Terms

In one respect, the future of the British independent airline operators, it is no exaggeration to say that the Minister of Aviation is more Socialist than the Labour Party, for he wants the Independents merged into three or four groups powerful enough to compete with BOAC and BEA. What a Gilbertian idea! A Minister whose party supports the concept of private enterprise free (in theory, at least) from State control proposes to use the powers of the State—in this case the future Air Transport Board's granting of route licences—to enforce mergers among private-enterprise airlines so that they can provide more competition for the corporations.

The result will be a contradiction in terms—State-controlled private enterprise, under which Independents may well find themselves more frustrated and restricted than they were a decade ago under a Socialist government. Then, at least, there was complete freedom, within certain narrow limits, for anybody with the price of a war-surplus Anson or Dakota or Halifax to start up as an Independent and make as much of the limited opportunities then available as his capital and business abilities allowed. Lack of either or both of the latter resulted in many early post-war Independents going out of business, and the mortality rate among them was high; but there was never any of this portentous mumbo-jumbo about reshaping them or making them stronger. One would have thought that Mr Sandys would appreciate that the more Independents there were, the more competition for the corporations, and that the bigger the potential market for new British transport aircraft the stronger the industry. Rationalization here certainly cannot be excused on the grounds that the Government, as the largest customer, pays the piper and is therefore entitled to call the tune. Its only justification in this instance seems to be an itch to meddle, a pathological desire to enforce conformity. That twentieth-century phenomenon known as "planning" is becoming increasingly obsessed with abstractions, and less and less inclined to relate those abstractions to reality; only under conditions of absolute conformity do such abstractions as "reshaping into stronger units" have any meaning.

Two Parallels

And the aircraft industry is not the only one in which a Tory government has sacrificed the independence of private enterprise to the State's convenience. To quote two examples, there was the Government-sponsored scheme for reorganizing the cotton industry and Government pressures on the motor industry to select suitable areas for major new extensions. The dispassionate observer cannot fail to be struck by the irony of a situation in which a defeated Labour Party is engaged in agonized reappraisal of nationalization, while the victorious Tories are drifting closer and closer towards exactly the same doctrine—to the concern, it should be added, of Tory purists who are uneasy about their party's adaptation of "the gentlemen in Whitehall know best" philosophy.

There's many a true word spoken in jest, and for an explanation of this puzzling pattern we must turn to that acute and brilliantly witty study of British politics called "How to Become an M.P.," by Gerald Sparrow. "Let us be cold here" (writes Mr Sparrow) "and probe into what exactly the Tories stand for. They stand for two great objectives. The first is that the country should continue to be governed by the right people. The second is that the wrong people should be looked after well enough to prevent bloody revolution." Hence the similarity between the two major political parties, both of which are now too fully committed to looking after the wrong people to be able to draw back, even if they wished to. The results of this are already apparent: this country is in grave danger of becoming an introvert community, too obsessed by "You've never had it so good" and rising standards of living at home to play its rightful part in foreign affairs or even to defend itself properly. This introvert tendency in British politics was spotlighted by a particular point made by Sir John Glubb in his recent book "Britain and the Arabs." After stressing the "absence of policy, neglect of clear thinking, vacillation and drift" of Britain's actions in the Middle East over the past 50 years, Sir John continues: "On the one hand, ease of communication has resulted in the over-centralization of all power in London, depriving the man on the spot of authority. On the other hand, the over-burdening of the Cabinet with more and more duties, and the increasing pressure of party politics, has rendered the politician at home less and less capable of taking action." This is well worth bearing in mind, if only to discount those apologists who try to excuse episodes like Suez by saying that the military were not ready, or did not have the right equipment.

Taking Sir John Glubb's statement a stage further, our Middle East policies in particular demonstrate that British politicians seem to have lost all sense of the importance of air power as a means of furthering foreign policy. It was to air power that we owed our survival in 1940, but for all the airmindedness that Ministers show today the Battle of Britain might have occurred two centuries, not two decades, ago. Yet in the nineteen-twenties some of the boldest and most imaginative applications of air power then thought of were made by the RAF in the Middle East. In particular, modern airlift techniques were foreshadowed by the dramatic evacuation by air of 586 people from the British Legation at Kabul, Afghanistan, as a result of civil war in that country; beginning on December 12, 1928, this airlift went on until February 25, 1929, and not a single life was lost. Vickers Victorias of No 70 Squadron were mostly used. There was also Sir Samuel Hoare's doctrine of "control without occupation" applied by the RAF in Iraq, in which air power was used to maintain the peace without the expense of occupying a large and sparsely populated area. But men like Sir Samuel Hoare and Sir Sefton Brancker, who controlled our aviation destinies in those days, possessed vision and practical enthusiasm, qualities which have been sadly, indeed almost totally, lacking in the post-war guidance of British aviation, probably because in present-day politics conformity is valued more than enthusiasm.

Political Device?

It requires a powerful magnifying glass to distinguish the difference between Mr Gaitskell's idea of the State buying shares in private industry (the so-called "back door nationalization" only recently discarded by Labour) and Mr Sandys' concept of State-controlled private enterprise in which the aircraft industry is "persuaded" to reshape itself by the threats of its largest customer to withdraw or withhold its business unless such reshaping is undertaken. Mr Sandys is really just like the BBC sound-effects man who asked for a horse to get the effect of knocking two coconut shells together; his and Mr Gaitskell's version of State intervention in private enterprise are so similar that one is driven to the conclusion that the recent rationalization moves were a shrewdly calculated piece of political opportunism intended to take the wind out of nationalization's sails and leave the Socialist ship of state becalmed and in the doldrums, while the crew grows mutinous.

But, it may well be asked, is it not grossly unfair to accuse the Minister of indulging in political opportunism? Does not the recent Hawker Siddeley/de Havilland merger represent an endorsement by hard-headed businessmen of what admittedly may have started as a political theory? And does not such a merger set the seal of commercial approval on a politically instigated measure? Unfortunately one cannot give a completely unqualified "Yes" to all these questions, for it is not known how much freedom of choice the participants in this merger were allowed. They had been called in separately for confidential talks with the Minister. And doubtless these talks were conducted discreetly, decorously and in the nicest possible way. But if a gunman puts a pistol to your back and tells you not to move, what choice is there except to stand still—unless, of course, you want to be killed?

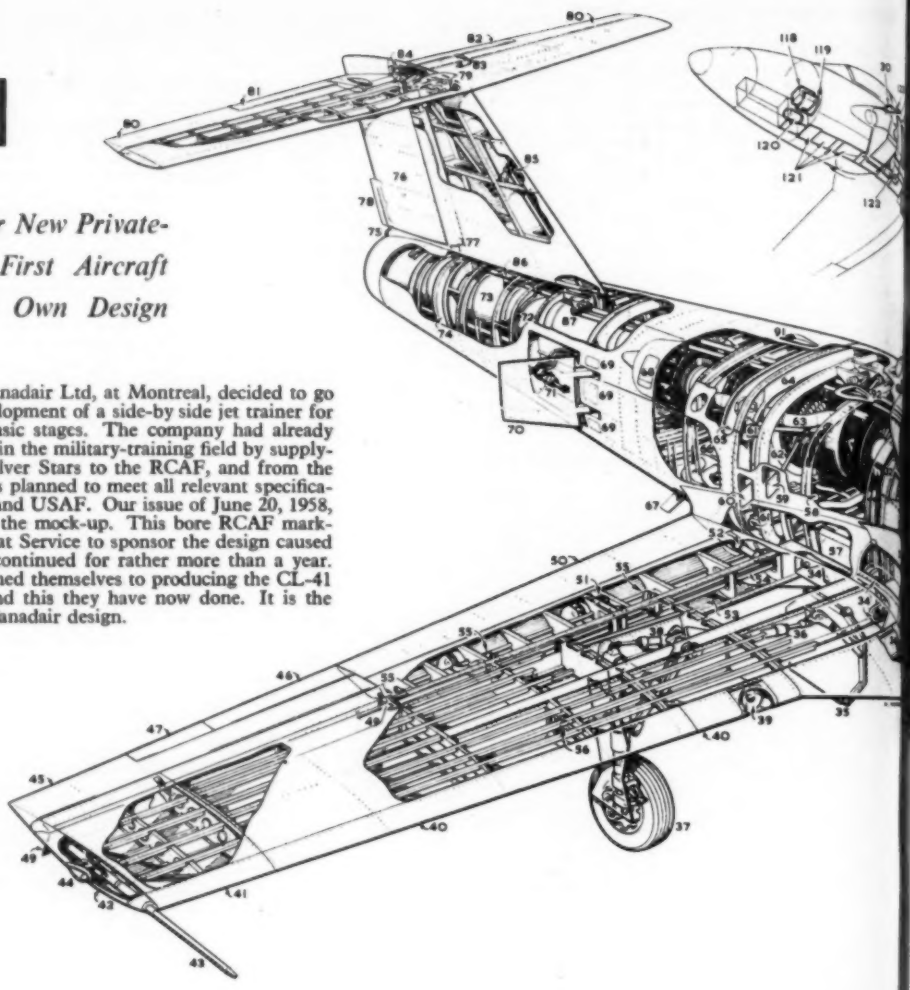
This is what is so disturbing about the Minister's reshaping of the industry. It is being done by political pressures to fit into a predetermined theoretical mould and not, as it should be, by commercial pressures based on the uninhibited laws of supply and demand. What should be essentially an extrovert industry—"extrovert" in the sense that a high proportion of its revenue comes from exports—is being reshaped to match an essentially introvert political outlook; one that takes no account whatever of the trends towards lower air fares already gaining impetus and the demand that these will generate for low specific-cost airliners able to pay their way on the really cheap fares of the future, nor of future Russian competition (possibly undercutting IATA rates) on long-haul routes.

The verdict of history may well be that rationalization was as disastrous in the nineteen-sixties as appeasement was in the nineteen-thirties. Future historians will doubtless view it as symptomatic of a society that valued individuality less and less and conformity more and more.

CL-41

Canadair Fly Their New Private-venture Trainer: First Aircraft Entirely of Their Own Design

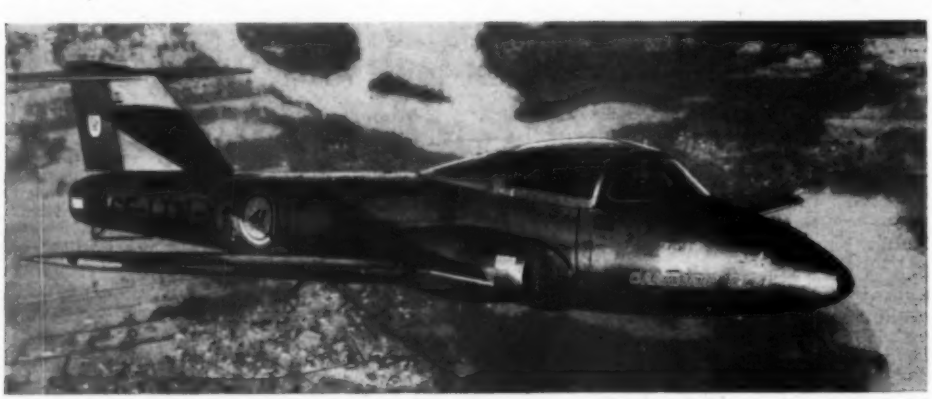
THREE years ago Canadair Ltd, at Montreal, decided to go ahead with the development of a side-by side jet trainer for the *ab initio* and basic stages. The company had already acquired great experience in the military-training field by supplying 900 Nene-powered Silver Stars to the RCAF, and from the outset the new trainer was planned to meet all relevant specifications of the RCAF, RAF and USAF. Our issue of June 20, 1958, included a photograph of the mock-up. This bore RCAF markings; but the refusal of that Service to sponsor the design caused the programme to be discontinued for rather more than a year. Eventually Canadair resigned themselves to producing the CL-41 with their own money, and this they have now done. It is the first machine entirely of Canadair design.



These drawings have been prepared by Canadair Ltd, and serve to emphasize the major design choices. In order to minimize rolling moment — a matter of importance in assessing spin-recovery—all fuel is carried in the fuselage. Both instructor and pupil have lightweight ejection seats

Having started later than their many competitors it has not been difficult for them to produce a jet trainer which, on paper at any rate, is the best of all. Partly as a result of the employment of an engine of exceptional thrust/weight ratio and economy, the brochure performance is outstanding. Although heavier than any other basic trainer, the new Canadair has the highest maximum speed and shortest time to height (apart from the non-standard Jet Provost with the ASV.11 engine), and of even greater consequence is the fact that it surpasses its rivals handsomely in range and endurance. Two typical missions are outlined in the table of data on the opposite page.

Most of the salient characteristics of the aircraft can be seen in the company's cutaway drawing reproduced here. Structure is quite conventional, light alloys being employed throughout and the ultimate load factor being no less than 11. Canadair are justifiably proud of the speed range from 65 to 412kt; and, with a limiting Mach number of 0.8 and two large airbrakes, the rate of descent is greater than that of any other basic trainer. Exhaustive model testing confirmed Canadair's hope that, partly by employing a T-tail and keeping all the fuel near the centre of gravity, spin recovery would be exceptionally rapid. Safety features include ejection seats, intake debris guards, a "bird-proof" wind-



During its first flight over the snow-clad Quebec countryside the CL-41 was restricted to 15,000ft and 320 m.p.h. Later it should fly a matter of 30,000ft higher and 155 m.p.h. faster

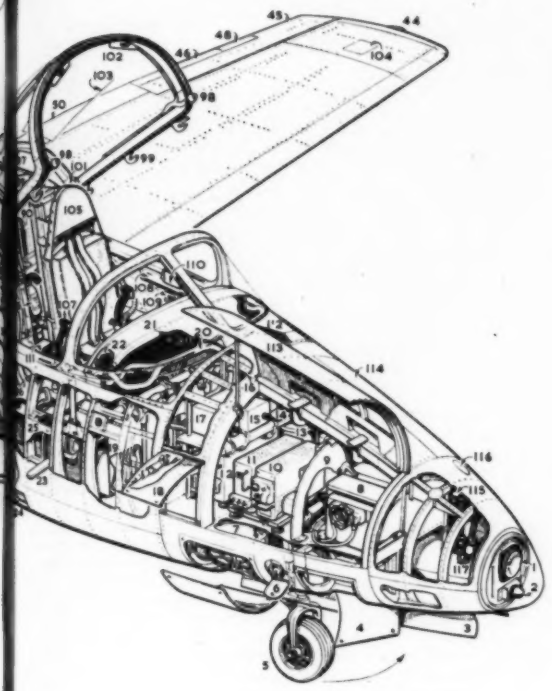
screen, an abnormally high gear-down speed of 175kt, an annunciator panel with individual warning lights for all likely emergencies, simple manual flying controls, inherently good ditching characteristics, a steerable nosewheel and a structure specially designed to withstand crash-landing (the cockpit region is stressed axially to 24g).

In common with most of its competitors, the CL-41 can carry a varied assortment of stores. No guns are installed, but a pod housing rifle-calibre weapons may be carried on the single pylon beneath each wing. These pylons can also carry rocket pods, napalm, bombs of up to 500lb or auxiliary tanks. The Pratt & Whitney JT12 is cantilevered from the rear of the centre fuselage, and is bared completely by pulling off the rear end and empennage. Major access to systems is obtained via doors along the ventral centre-line, which open on to an unpressurized tunnel and, at the rear, to the powerplant and its accessories. Equipment in the nose section can be reached through large doors at waist level, and it seems likely that no ground equipment or trestling of any kind will be required for normal operations. Fuelling is carried out from a single point.

The cockpit is exceptionally capacious, and the automatic pressurization and air conditioning enable extended missions to be flown up to 18,000ft without oxygen. With oxygen in use 38,000ft is a fair limit for normal operations, the cabin altitude then being 23,000ft. Even at heights of this order there is plenty of excess thrust for manœuvres, and the data indicate that the rate of climb at 30,000ft is still substantial. Moreover, all this is achieved with a derated engine, in order to improve reliability and overhaul life; Pratt & Whitney are lifing initial fully-rated JT12s at 600hr, and this will "subsequently be increased to 1,000." (Incidentally, it is worth noting that the engine was actually designed by Canadian Pratt & Whitney in Montreal.)

Canadair's flight-test personnel have been exceptionally busy this winter. In the last two months they have flown the first production Canadair 540 (two Napier Eland) and the CL-44 heavy freighter (four Rolls-Royce Tyne). The trainer did not fly until January 13, but Ian MacTavish, the company's assistant chief engineering pilot, made up for the somewhat delayed start to the flying programme by going through a whole routine of aerobatic manoeuvres at 15,000ft during a 70-min shakedown.

As the accompanying photograph shows, the first of the two prototypes bears civil experimental registration. Both aircraft have been constructed with company money, and Canadair are naturally anxious either to sell some complete aircraft or at least manufacturing rights. Certain foreign air attaches in Montreal have been showing keen interest in the aircraft; and, notwithstanding its late arrival into a most competitive field, it seems to have a good chance of success.



1 Taxi light
2 Ground observer light
3 Nosewheel doors
4 Access to D.C. relay panel and battery drain
5 Forward-retracting, steerable nosewheel
6 Liquid-oxygen filler
7 Liquid-oxygen convertor
8 24 volt, 36 amp-hr battery
9 Electrical main distribution panel
10 17L-7 type VHF transmitter
11 51X-2 type VHF receiver
12 51Y-1 type VHF receiver
13 Gyro control unit
14 Gyrosyn amplifier type A2
15 AM300/AIC type AF amplifier
16 Heat and vent regulator and shut-off valve
17 AM142/AIC type mixer amplifier—two units
18 ADF receiver access door
19 Dual-control rudder pedals
20 Heat and vent ducting
21 Main instrument panel
22 Throttle lever and flap control
23 Retractable footstep
24 Kick-in step
25 R.H. console electrical controls
26 Utility cockpit light
27 Debris screen actuator
28 Air intake debris screen, operated in conjunction with undercarriage
29 Air intake
30 Forward fuel cell
31 Centre fuel cells
32 Rear fuel cells
33 Personal-baggage access each side
34 Wing/fuselage attachment points
35 Main-gear door—closed when undercarriage locked down
36 Actuator for (35)
37 Main landing gear—Goodyear brakes
38 Actuator for (37)
39 Landing light
40 Detachable leading-edge panels
41 Detachable wing tip
42 Tip access panel
43 Pitot/static tube
44 Wing navigation lights
45 Ailerons
46 Aileron spring tabs—solid honeycomb construction
47 Aileron trim tab ground adjusted
48 Aileron trim tab electrically operated
49 Aileron shroud access panel
50 Single-slotted flaps—honeycomb panels
51 Flap actuator
52 Flap interconnect actuator
53 Flap shroud access panels
54 Aileron control and interconnect rods
55 Aileron control rod bellcranks and idlers
56 Attachment point for external stores
57 Engine access doors
58 Pressure-differential regulator and shut-off valve
59 Starter external power receptacle
60 Ground power receptacle
61 Engine bearing strut hinge points
62 Engine bearing struts
63 Compressor bleed duct
64 Fuselage break for engine removal
65 Aft firewall
66 Primary heat exchanger
67 Fuel vent mast
68 Fire-extinguisher access panel
69 Airbrake hinge access panels
70 Airbrake
71 Airbrake actuator
72 Tailpipe support ring
73 Tailpipe
74 Fin-attachment bulkheads
75 Tail navigation light
76 Rudder
77 Rudder bottom hinge
78 Rudder bend tab
79 Tailplane-attachment points
80 Elevators—solid honeycomb construction
81 Elevator gear tab—starboard only
82 Elevator trim tab
83 Elevator trim-tab actuator—port only
84 Elevator control lever
85 Elevator controls
86 Rudder controls
87 Elevator/rudder control rod idlers
88 Elevator/rudder control rod levers
89 Elevator/rudder control rod bellcranks
90 Elevator/rudder control rods.
91 Flush inlet—cooling air aft of firewall
92 Flush inlet—cooling air forward of firewall
93 Engine oil filler access
94 Upper position light
95 Electrically operated, jettisonable canopy
96 Canopy actuating and jettison mechanism
97 Canopy hinges
98 Canopy demist disconnect points
99 Canopy latching hooks—engaging with rollers at (100) when canopy closed
100 Canopy roller slots
101 Canopy seal disconnect
102 Rear view mirrors
103 Sense aerial
104 Flux valve access
105 Ejection seats
106 Fire extinguisher
107 Control columns
108 Cabin air distribution
109 Canopy manual operation—accessible from outside
110 Magnetic stand-by compass
111 Centre console—electrical/radio controls
112 Windshield defrost hot-air outlets from heat and vent system
113 Electrical/radio compartment access door
114 Nose stowage access door
115 Brake fluid reservoir and pressure transmitter
116 Brake fluid reservoir access
117 Nosewheel steering selector valve
118 Secondary heat exchanger
119 Secondary heat exchanger access
120 Cooling turbine
121 Underside access panels to flying controls, hydraulic and electric lines and heat and vent ducting carried in unpressurized tunnel under cockpit floor
122 Fuel collector tank, incorporating negative-g boost pump. Fuel is contained in five interconnected cells 30, 31 and 32. Total usable fuel capacity, 250 Imp. gal.
123 Fuel-filler access

CANADAIR CL-41

Powerplant: Pratt & Whitney JT12A-2. Single-shaft turbojet with nine-stage compressor and two-stage turbine. Normal maximum thrust, 2,900lb, with specific consumption of 0.84; in the CL-41, the engine is derated to 2,400lb to improve life. Initial overhaul life will not be less than 600hr.

Dimensions: span, 36ft 4in; length, 32ft; height, 9ft 4.5in; track, 13ft 2.74in; wheelbase, 9ft 5.25in; gross wing area, 220 sq ft.

Weights: design gross weight (also max landing weight), 6,500lb; maximum internal usable fuel (JP-4), 1,750lb.

Performance (ISA, estimated): sea-level take-off to 50ft, 1,830ft; initial rate of climb, 4,100ft/min; rate of climb at 30,000ft, 1,400ft/min; time to 30,000ft, 11.7 min; service ceiling, 44,500ft; maximum speed, 385kt at sea level, 412kt at 30,000ft; dive limit speed, 500kt e.a.s., or M 0.8; stalling speed, 65kt e.a.s; landing distance from 50ft, 1,920ft.

Typical missions (internal fuel only): a training mission might consist of a take-off and climb to 15,000ft, 10min; medium and steep turns at 15,000ft, 10min; stalls and recoveries, 5min; emergency-landing practice, 12min; return to base at sea level, 5min; circuits, 42min; reserve, standing-off at 5,000ft, 64min; total mission, 2hr 28min. A maximum-range mission could cover 800 n.m., cruising at 311kt at 38,000ft for a total time of 2hr 25min, with 175lb of fuel remaining.

Sport and Business

In the Air with the Mooney Mk 20 . . .

No. 117 OF THE SERIES By ALASTAIR PUGH

A CRUISING speed of 160 miles an hour on about 124 cruising horsepower is spanking performance by any standards; applied to a full four-seater, comprehensively equipped and safe and easy to fly, it implies aerodynamic refinement of a high order.

This is the measure of the Mooney Mk 20, one of the half-dozen or so American business aircraft that are now finding a welcome reception in this country. The United Kingdom agents, Travelair Ltd, of 115 Oxford Street, London, say that sales prospects seem encouraging. Three variants are available, all externally practically identical. The mark numbers 20, 20A and 21 distinguish the installation of alternative Lycoming engines; the Mooney Mk 20 is equipped with the 150 b.h.p. O-320, the Mk 20A with the 180 b.h.p. O-360 and the six-cylinder 250 b.h.p. O-540 is installed in the new Mk 21.

Unmistakably an American light aeroplane both in appearance and feel, the Mooney is in many respects a more venturesome design than its perhaps better-known contemporaries; it bears the impress of the single guiding mind that can instil both character and charm into vehicles of ostensibly quite utilitarian purpose.

In the Mooney Mk 20 it is obvious that good aerodynamic form has been the designer's first aim, and that conventional structural techniques and control arrangements have been abandoned rather than compromise this ideal. Surprisingly enough, this policy has not resulted in a high first cost.

The Mooney is notable for its laminar-flow wing of almost symmetrical profile, the choice of which also more or less determined the design of the tail unit and the adoption of mixed wood and metal construction; a ply-skinned wing was chosen because it offers the most convenient and least expensive way of producing a smooth surface. The assembled unit is dipped in a thermo-setting resin and pressure-bonded to seal it for the life of the aircraft. A written guarantee is issued to this effect, although at present it is necessary to remove the rear seats (and fuselage tank if one is fitted) and re-varnish the centre section spar every 50hr.

Making my first detailed acquaintance with the Mk 20, it occurred to me that this smooth and shapely wing should give a private owner a great deal of aesthetic pleasure, apart from the more tangible advantages of a low drag coefficient and excellent fuel economy. The upper surface from root to square-cut tip is broken only by the flush fillers over the inboard 14 Imp gal tanks and a small stall lip on the leading edge near the root. Ailerons are neatly shrouded and the Fowler-type flaps—which extend from root to aileron—also tuck neatly away.

Complementary to the laminar-flow wing is the all-moving tail unit, which pivots—fin, rudder and all—forward of the elevator spar, so that no part of the sharply-raked rudder is blanked off by changes in elevator or tailplane angle. These horizontal surfaces are spring interconnected, so that the optimum combination of angles is adopted under any condition of trim; but from the cockpit it is impossible to detect the subtleties of this aerodynamic inter-relationship.

Entry to any of the cabins is easy and sliding front seats on long runners make an elegant entry perfectly feasible.

A personal foible is for room in which to stretch my legs; and, with its sliding seats and push-pull control half-wheel, the Mooney is particularly good in this respect—although with the seat set far enough back to accommodate a really tall pilot, leg room for the rear-seat passengers is limited. But this has been partly rectified in the 1959 models.

The importance of being different: the Mooney demonstrates this year's swept-forward look "Flight" photograph

From the left-hand front seat one has the impression of sitting in a sports car; the nosewheel tunnel projects back into the cockpit like a gearbox, and the sturdy undercarriage lever is mounted vertically from the floor in a position that might, in a car, be used for a handbrake. In spite of an extra seat cushion the dash coaming was rather higher than I liked and the view over the flat nose a little restricted; but it seems that on this particular demonstrator the "contoured seats with no-sag springs" had in fact settled. If you were not particular about wearing your executive bowler, there would be plenty of room for an additional inch or two on cushion height.

The pale grey instrument panel is well stocked, albeit a little untidily, with flight and engine instruments, radio, and rows of red circuit-breakers across the bottom.

Fuel-system management is quite straightforward, a floor-mounted lever selecting left, right or reserve (11 Imp gal) tanks, the last-named situated under the rear seat. Engine starting is as certain as one has come to expect; earlier I had asked to look at the engine installation, but reliability in this department is taken so much for granted that the cowling is secured with literally dozens of self-tapping screws, and is normally only opened for 50hr inspections.

After checking the magnetos and the Hartzell V.P. propeller and calling for clearance, I unlocked the parking brake (the button is marked "choke") and taxied out to the runway holding point, enjoying the precise control conferred by the steerable nosewheel and differential toe brakes. Both throttle and propeller

Full equipment on this American Mooney includes a two-axis autopilot, ADF and Omnigator. Ranged along the lower edge of the left-hand panel are electrical instrument, fuel pump and light switches and, to the right of the wheel, parking brake, cabin heat, ventilator and carburettor air controls. Circuit breakers are on the starboard panel opposite; engine controls above them include oil and fuel pressure and cylinder head and oil temperatures. Centre top are the mixture control, key switch, and master switch and below are throttle and propeller controls. Underneath are the cowl-flap button, undercarriage and flap levers. On the right Donald Carnegie gives scale to the only British-registered Mk 20A "Flight" photograph

controls are of the push-pull variety and both are locked in position by a release button in the knob, operated by the palm of the hand. In addition, a vernier control of the knobs is obtained by rotating them.

Vital actions include setting the flaps manually to the 15° take-off position by a quite small gated lever just below the dashboard, switching on the electric back-up fuel pump, checking fuel pressure and wing tanks contents with a left-right switch (the reserve tank has a gauge of its own), cowl flaps open and a check on the individual suction gauges.

Lined-up on the runway centre line, I released the toe-brakes by sliding my toes (as I had been instructed) well down each pedal, and drove down the runway with the Lycoming running quietly and smoothly at 2,700 r.p.m. and 26in Hg. There was no difficulty at all about keeping straight in a fresh cross-wind.

The Mooney accelerates quite quickly and in a 10 m.p.h. wind, less than 200yd of runway will have slipped by before it unsticks at just under 60 m.p.h. in response to a firm pull on the wheel.

Undercarriage retraction is said to take only two seconds; the spring-loaded grip on the robust lever is grasped in the right hand, pulled out from its lock in the facia and swept backwards in an arc until it lies parallel with the floor. At a first try it seems a bit of a contortionist's trick, but provided a strong sweeping pull is used the effort is not very great and the positive feel of the undercarriage going up or down is most re-assuring.

There is very little trim change when the wheels go up, or as the flaps are retracted by flipping the lever up out of its gate, although there is some sink. For the initial climb the airspeed is held down to 80 m.p.h., when the nose points very high and the runway drops quickly away below. I found this initial attitude rather disconcerting and directional stability only fair (there is no rudder trim), but the steep climb is intended only to lift the Mooney over obstructions at the end of the field before the rate of climb is adjusted either for the best rate-of-climb speed of 95 m.p.h., or the normal speed for climb to cruising altitude—120 m.p.h. at full throttle and 2,550 r.p.m. In this condition the aircraft is gaining height at 600ft/min and the view over the nose is much improved. Control forces are light and the controls positive and well harmonized.

Levelling off at 3,000ft and throttling back to the cruise setting of 2,400 r.p.m. and 24in Hg, the Mooney quickly attains its cruising speed of 140 m.p.h. i.a.s. (about 160 t.a.s.) and settles into an even, stable ride which requires very little concentration to hold. This Mooney had no autopilot, but it continued to bore happily along its path with only cursory attention. Cockpit noise-level, thanks partly to a brace of silencers on the Lycoming, is commendably low.

Visibility in most directions is good, although once again my rather low seat was cause for a grumble about the view directly forward, and in steepish turns to starboard the rather wide and tapered windscreen pillar and the bulk of a front-seat passenger obscure most of the useful view.

A characteristic of the Mooney is a marked increase of stability with speed. Above the "manœuvring speed" of 130 m.p.h. i.a.s. the controls stiffen appreciably; and, although harmonization remains satisfactory, all surfaces, and particularly the ailerons, become rather heavy. Rolling from one steep turn into another requires appreciable effort. At cruising speed longitudinal stability is very positive.

All the controls remain effective right down to the innocuous stall, which occurs with no prior aerodynamic warning at about 57 m.p.h., to the accompaniment of a reedy piping from the stall-warning indicator and a more sonorous bleep from the undercarriage warning horn.

A normal stall followed by a release of pressure on the wheel preparatory to giving it a really sharp tug backwards, at the same time rocking the wings with aileron, resulted in a quite unspectacular and gentle waffle, with the Mooney losing height at a deceptive 2,000ft/min. Flying speed was regained as soon as pressure on the stick was released.

The camera looks beneath the wing and finds the only cut-outs in an otherwise unbroken surface
"Flight" photograph

This good low-speed control—and the light stick and pedal forces which accompany it—makes the Mk 20 very pleasant in semi-stalled manœuvres and it can be flown with positive control all the way round precise lazy-eight manœuvres. Another useful characteristic is that pushing the propeller control into fine pitch results in marked deceleration, rate of descent building up rapidly to 2,000ft/min at a forward speed of only 140 m.p.h. i.a.s. Clean, and at 100 m.p.h., gliding ratio is said to be 1 in 15.

On the downwind leg the undercarriage can be lowered below 120 m.p.h. and the flaps at 100 m.p.h. The button-release throttle asks to be left alone on the approach, and all adjustments made on the vernier. I selected an arbitrary setting and motored in at about 80 m.p.h., the controls still feeling quite crisp and responsive at the reduced speed. Forward visibility was excellent and the let-down all very straightforward and easy.

The wheels (absorption is by rubber-in-compression) touched just on the stall point after very little float and the aircraft dropped gently on to its nosewheel; but I spoilt the satisfaction of a good landing by getting my feet too high on the rudder pedals and inadvertently applying a touch of starboard brake. This confirmed my earlier reservations on the brake position and I was not altogether surprised to learn that the 1959 Mooneys have redesigned units in which the brakes are not so close to the rudder pedals.

It seems obvious that as more US light aircraft are introduced into the United Kingdom the value of secondhand British aircraft is going to be depressed. At £6,950, duty and delivery paid, the Mooney offers value that cannot be equalled by the home industry's past products. Nor, with an endurance of up to six hours and a fuel consumption of 21 a.m.p.g. coupled with a cruising speed of about 160 m.p.h., can operation of the Mooney Mk 20 be called uneconomical.

Leading Data

Dimensions: Span 35ft; length 23ft 2¾in; height 8ft 3½in.
Weights: Max. 2,450lb; empty 1,415lb; payload 1,035lb; baggage capacity 120lb.
Performance: Max. cruising speed at 4,900ft, 75 per cent power, 165 m.p.h.; economy cruising speed at 10,000ft, 55 per cent power, 150 m.p.h.; range at max cruising speed 600 st miles or 750 st miles with aux tank; range at economy cruise 675 st miles or 900 miles with aux tank: rate of climb at sea level 900ft/min; service ceiling 17,200ft; take-off distance 725ft; landing distance, flaps down, 575ft.

. . . and the Mooney Mk 20A

RENEWING acquaintance with the Mooney some time after the foregoing was written, I was again at once impressed with the neat, almost diminutive appearance of this compact and attractive four seater. The Mk 20A I flew is privately owned by Donald Carnegie and at the moment is the only Mooney in Great Britain. It is serviced and hangared by McAlpine at Luton and the owner says that he would be only too pleased to give demonstrations to anyone who is seriously interested.

A newer aeroplane than the Mk 20 I flew earlier, this Mk 20A exhibits a number of pleasant refinements. The cockpit is more spacious than previously, instruments are more logically arranged and a retractable entry step is fitted below the trailing edge of the starboard wing. Retraction of the step now becomes an item in the cockpit check list.

It is raised or lowered by a rather stiff winder on the cabin wall near the forearm, and with logic typical of present-day American light aeroplanes there is a stencil near the handle indicating that 2½ turns are required. Similar reasoning is extended to the tank selector cock beneath the pilot's legs, which indicates the fuel capacity of each tank. On this aircraft maximum contents are marked in US gallons; 24 Imp gal fills the three tanks full and this is theoretically sufficient for an endurance of four hours. The present owner has checked the chock-to-chock fuel consumption over a period of about nine months as being not more than 6 gal/hr.

In relation to the lower-powered version, the Mk 20A handles much as one might expect. The rate of climb is rather better (a check between 4,000ft and 5,000ft showed that the rate of climb at cruising r.p.m. was still 650ft/min), cruising speed is

(*Continued at foot of page overleaf*)

This new version of the Rollason Turbulent, seen in the snow at Redhill recently, incorporates a sliding canopy, spatted wheels, and independent braking to each wheel. Cruising speed of the aircraft, powered by a standard 30 h.p. Ardem, is improved by some 5 m.p.h.

SPORT AND BUSINESS . . .

VERY MUCH A STEP in the right direction is an arrangement introduced by the Ministry of Aviation whereby flight plans may now be filed for flights between a number of aerodromes at which such a facility was not previously available.

Linking major civil airports in the British Isles is the Aeronautical Fixed Telecommunications Network of teleprinter stations, and what has now been done is to connect most other British aerodromes to their nearest major "parent" station by public telephone, and to arrange that the parent passes on the message to the destination airfield—whether the latter is on the teleprinter network or not.

Several categories of message can be passed under this system, including, of course, safety and distress messages (which carry highest priority) and—perhaps of more everyday interest—all messages in the "flight safety" category; a phrase covering traffic-control messages, flight planning, position reports and so on. Other messages are also permitted, and these are set out in Part 1 of Appendix 11 (COM 141) to *Air Pilot*. The airman's "bible" also gives in rather formidable detail the form in which various messages should be transmitted—it is necessary, for example, for the sender to give his initials at the end of the message and the receiver will do the same when he reads it back.

Who pays for the telephone call? In the case of a message passed on to the parent station, the aerodrome authority or the pilot of the aircraft foots the bill, but the Ministry will pay for calls transmitted from parent stations. Details of the scheme are given in a recent *Civil Aviation Information Circular No 3/1960* which includes a list of aerodromes and parent stations to which the scheme applies; it is sufficiently inclusive to make this a useful cross-country facility for club, private and business pilots.

EIGHTY-FOUR SAILPLANES from 26 countries have been entered for this year's World Gliding Championships at Butzweilerhof, near Cologne. No fewer than 61 of these are 15-metre machines in the standard class. A practice-flying period from May 29 to June 3 will precede the championships, which will be opened on June 4 and will continue until June 18. The organizer of the meeting, on behalf of the German Aero Club, will be Seff Kunz, and 25 Dornier Do 27 aircraft will be used for aerotow launches.

The German team of three pilots will be chosen from Ernst Günter Haase (the current world champion), Heinz Huth, Hans Böttcher and Rolf Spänig. The countries which have entered are Australia, Austria, Belgium, Brazil, Canada, Czechoslovakia, Denmark, Finland, France, Great Britain, Hungary, Iceland, Israel, Italy, Jugoslavia, Netherlands, Norway, Poland, Rhodesia, Rumania, Spain, Sweden, Switzerland, USA, USSR and Western Germany. Entries from Japan, the Argentine and South Africa are also anticipated.

The gliding research organization OSTIV is again holding its bi-annual congress in conjunction with the championships, and this year Cologne has been selected as the location.

PRIVATE AND EXECUTIVE aircraft sold by Cessna Aircraft Co during 1959 numbered 3,564. These comprised 648 Model 150s, 874 Model 172s; 727 Model 175s and Skylarks, 258 Model 180s, 774 Model 182s and Skylanes; 43 Model 210s and 240 twin-engined Model 310s. In the US light-aircraft field Cessna have been first on the basis of unit sales for the past four years, and first in terms of dollar volume for three of these four years. Four of the company's 1960 range of aircraft were illustrated in our January 15 issue; Cessna's UK representatives are Airwork Services, 35 Piccadilly, London W1 (Regent 8494).

WINNERS of the two flying scholarships offered by the Air Schools group to mark the parent company's 21st birthday are E. R. Goodwin, who is learning to fly at Elstree Flying Club, and R. H. Calder, who is flying at Derby Air Centre. At Elstree, the tower is now operating on 122.4Mc/s; normal hours of control watch are 9.30 a.m. to 1 p.m. and 2 to 5.30 p.m.

TURBOJET-POWERED LIGHT AIRCRAFT are to be operated by Ostrava Flying Club, the largest club in Czechoslovakia. The aircraft type has not been specified, but the machines will be of indigenous design and manufacture.

PERFORMANCE OF THE RW3 MULTOPLANE has been improved with an increase in power of its Porsche engine from 65 to 75 h.p. Some 25 aircraft have been built to date, of which 18 have been sold, mainly in South America and the USA.

RETROSPECT

From "Flight" of January 29, 1910

Mdlle. Dutrieux Has a Fall: On the 21st inst., while Mdlle. Helene Dutrieux was practising on her Santos-Dumont machine at Issy, she had a somewhat exciting experience, which fortunately ended without injury to herself. The ground was very muddy and heavy, and in her endeavours to get the machine to rise Mdlle. Dutrieux pushed the elevating-lever right over, with the result that the machine shot up very suddenly to a height of 10m. It flew along for a few minutes, and then as suddenly fell forward, and after striking the earth remained standing perpendicularly. Much to the relief of the terror-stricken onlookers, Mdlle. crawled out from her seat quite unhurt by the fall.

. . . AND THE MOONEY Mk 20A (continued from page 145)

usefully higher and the slightly greater empty weight passes unnoticed. For this test the air was smooth and in the climb the 20A exhibited hands-off stability—the slight lack of directional stability commented upon earlier seemed no longer apparent. After levelling off at 5,000ft the Mooney settled down at 2,400 r.p.m. and 22.5in manifold pressure to accelerate up to its indicated cruising speed of 155 m.p.h. This Mooney also appeared to "lock in a slot" above the g-load manœuvre-limit speed of 130 m.p.h. i.a.s.; as the speed increases the stick forces also rise and pedal loads increase in sympathy—although very little rudder is ever required. In its groove the Mooney is highly stable; a 5 m.p.h. speed increase was almost completely damped out in one pitch cycle.

There is a further limitation to be watched for at the high-speed end of the scale. The Mooney has a definite V_{NE} of 183 m.p.h. i.a.s. and this speed is fairly close to the indicated cruising speed at, say, 70-80 per cent power. But no pilot need worry unduly about exceeding this, thanks to that endearing Mooney characteristic of limited speed build up when the nose is lowered. A couple of spot checks with the throttle closed and the propeller control untouched showed that the Mooney would descend at 1,000ft/min at 120 m.p.h. and at 1,500ft/min at about 127 m.p.h.

At 4,000ft I closed the throttle completely and went through a series of stalls in various configurations. Clean, the Mk 20A stalls at about 54 m.p.h. i.a.s.; with 10° flap and wheels down at 51 m.p.h., and with full flap at between 48 m.p.h. and 49 m.p.h. the stall occurring with warning only from the buzzer; a slight tendency to drop a wing is easily held. Absolute minimum flying speed with full throttle and 10° flap is about 43 m.p.h. i.a.s.—but this is a highly unstable condition of limited interest.

After some experience with the Mk 20 I anticipated no great difficulty in setting down the Mk 20A. And so it proved; the just-adequate flaps are moved down by the knife-through-hot-butter selector and below 120 m.p.h. the undercarriage lever is picked off the floor and thrust forward into its notch. It was then agreeably easy to hold the Mooney at about 80 m.p.h. on the final approach, but it sits so low on the ground that for the best results the flare-out must be made with the wings practically brushing the grass.

Quiet, easy to fly and apparently robust, the Mooney is yet another example of the refinement that ten years of active development has brought to US executive light aircraft. Among potential owners in Great Britain it deserves to be more widely known.

Leading Data

Dimensions: As Mk 20 except height, 8ft 4¼in.
Weights: Max, 2,450lb; empty, 1,440lb; payload, 1,010lb; baggage capacity, 120lb.
Performance: Max cruising t.a.s. at 6,500ft, 75 per cent power, 180 m.p.h.; economy cruising t.a.s. at 10,000ft, 55 per cent power, 165 m.p.h.; max rate of climb at sea level, full throttle, 1,150ft/min; normal range at 7,500ft, 630 st miles (with auxiliary tank 900 st mile); take-off distance, sea level, 10 m.p.h. wind, 600ft; landing distance, 10 m.p.h. wind, 575ft.

"FLIGHT" SAMPLES AN EAGLE AIRWAYS VERY-LOW-FARE DC-6C SERVICE

By J. M. RAMSDEN

BERMUDIANS do not accept that Eagle's application to operate regular very-low-fare services between London and Bermuda falls within the context of "VLF." These initials, it may be recalled, stand for the controversial applications made by this independent and two others, HCA and Airwork, to operate very-low-fare services between London and a dozen British Colonies.

Just as HCA and Airwork enjoy a special position in Africa because of their long-established Colonial coach services to that continent, so do Eagle feel that Bermuda is their sphere of influence. On July 26, 1957, Eagle registered an associated company in Bermuda. It was an imaginative attempt—with plenty of commercial risks involved—to transfer some of Eagle's eggs from the UK basket to another that might prove less confined.

At length, in May 1958, Eagle Airways (Bermuda) Ltd began operations with a Viscount 805 service between the Colony and New York. The history of this service is another story, which we hope to relate in a subsequent article. Suffice it to say for the moment that Eagle Airways Bermuda have been doing quite nicely. In addition to New York they now serve Montreal, Baltimore - Washington, and Nassau.

It is on record in the files of the Bermuda Government's civil aviation department, as *Flight* took note, that as long ago as October 18, 1957, Eagle Airways Bermuda applied to operate a scheduled service to London from the Colony. This application was granted by the Bermudian authorities on September 15, 1958. The fare was left open, and was later approved at £124 return (see later), £94 less than the BOAC tourist fare. The application is still in someone's in-tray in Berkeley Square House.

Note the dates. It was not until December 1958 that the parent Eagle company sprang its VLF surprise. When it did so, London - Bermuda was not included in the applications because this route had been applied for 14 months previously by an associate.

No wonder Bermudians feel that Eagle's proposed cheap air service to the UK should not have become involved in the VLF issue. They—and by "they" we mean Parliament and the Government—believe it to be a separate issue, for a variety of reasons other than that it was approved by Bermuda 16 months ago. An on-the-spot *Flight* inquiry into these reasons suggests that they might be summed up as follows:—

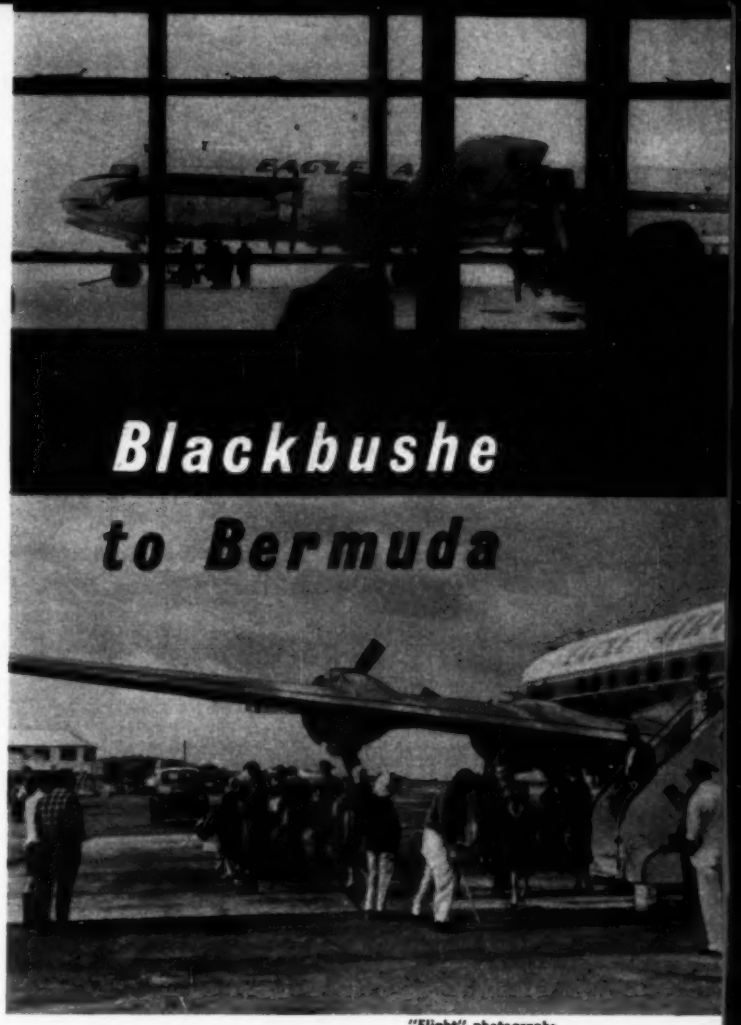
(1) The applicant is a Bermuda-registered company, with a relatively short but satisfactory record of service to the island.

(2) The only air link with home—that provided by BOAC—is not regarded as satisfactory.

(3) For 350 years Bermuda has traditionally (some would say notoriously) been a Colony which has looked after its own affairs. Its financial independence of the old country is complete: indeed, it has paid $137m into Britain's dollar reserves since 1939. It is intensely proud of, and does not want to break, its ties with Britain. Union Flags flutter from every flag pole, and there are a lot of flag poles. In return for its loyalty and financial independence it wants a say in its air communications.

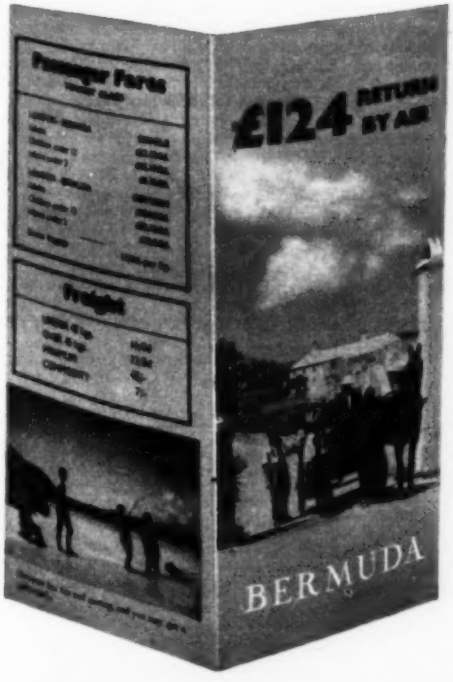
We asked the Bermuda Government's Director of Civil Aviation, Wg Cdr E. M. Ware, DFC, BSc, AFRAeS, for his views on Eagle's proposed service. The DCA could make no comment on the official attitude in the island towards BOAC, and he dismissed the suggestion that the local Eagle company was officially regarded (we use a phrase from Eagle's advertisements to the public) as "Bermuda's Airline." He explained that Bermuda's Board of Civil Aviation was the officially appointed air transport licensing authority. "It is my understanding," he said, "that this Board thought it in the public interest for Eagle Airways Bermuda to have a licence to operate a scheduled service between Bermuda and London. This licence was granted after a full hearing. It is embarrassing for the Board, as I understand it, that the UK authorities have so far been unable to decide whether this service can or cannot be operated into and out of the UK." He emphasized that 16 months had elapsed since the Bermuda Board of Civil Aviation had approved the Eagle application.

We tried to get closer to the heart of the matter, which—as



"Flight" photographs

Eagle's DC-6C G-APON, one of three owned by the airline, is seen in the snow at Blackbushe (their London airfield), and in the sunshine of a January day at Kindley Field, Bermuda. Below is the overprinted pamphlet used to promote the two special VLF flights



BLACKBUSHE TO BERMUDA . . .

This is what VLF looks like in practice

in the VLF problem as a whole—is HMG's stated determination to do nothing that will undermine the position of the State corporations. We heard many criticisms of BOAC. Because this airline is a State corporation it is highly vulnerable (and sensitive) to criticism, and a lot of unfair comment gets mixed up with the fair. Therefore we shall record only the remarks of a senior Bermuda Government official, who did not want his name to be disclosed, believing them to give the most balanced Bermudian view of BOAC's role in the island's affairs.

This official referred to "a very strong desire" on the part of the Bermuda Government to see Eagle Airways Bermuda expand. This airline would strengthen the tourist route to the US, a route three-quarters-dominated by US and Canadian carriers, and from which BOAC had at one time pulled out entirely. PanAm could, and given the chance would, carry all this traffic, and Bermuda did not want this vital tourist route—upon which 75 per cent of its entire economy ($30m in 1959) depended—so completely dominated by US carriers. [PanAm, who are now sweeping the route with jets, carried 46 per cent of the N. America - Bermuda traffic in the peak months April-September 1959, and Eastern Air Lines carried 22 per cent. The remaining third was carried by BOAC, 17 per cent; Eagle, 10 per cent; and TCA, 5 per cent.] "This is why we welcome Eagle as well as BOAC," he said.

He added that local people also felt strongly that the air services to the UK were "just not adequate." The corporation had been asked many times to "get organized" on the UK - Bermuda route, but the answer had always been that UK - Bermuda direct was not as profitable as via New York. Certainly BOAC had put more services through Bermuda, but at the same time they had added more and more "points beyond," like Caracas and now Bogotá. The corporation quite naturally wanted the end-to-end business, because it was more profitable. Meanwhile local people continued to find it difficult to get seats.

It was not only the shortage of seats: the fare direct to the UK was "just not competitive." Bermuda's position was that it was cheaper to fly to London via New York, or to Lisbon from Miami. The proposed low fare would not only generate new indigenous traffic—civil servants, schoolchildren, relatives and so on—it would tap a new tourist market in the UK. "One of our problems," explained the official, "is how to sustain the island's tourist business in the off-peak months of December, January and February. The preferable source is Europe, which means largely the UK." The only airline that could do something about this was the national carrier, BOAC. It had not yet done so, which was why Bermuda had welcomed and approved Eagle's proposal. [We had already learned that the UK contributed less than two per cent of Bermuda's 109,515 air tourists in 1959.] "What are the UK's best interests?" he went on to ask. "Are they not to develop the ties with the Colonies? But you can't keep on saying this to HMG. The Colonies today bear no resemblance to the Colonies of Imperial Airways' days, or even to the situation 15 years ago. Look at Jamaica—it could have the biggest airline in the West Indies if it wanted to. Mr Manley [the Jamaican Prime Minister, who has recently been saying that Jamaica might leave the West Indies Federation] is in the UK at the moment complaining about HMG's veto on PanAm's [illegible] services,* and he wants Chicago rights, too. You can't keep selling BOAC to these people for ever, and unless the Colonies' interests are encouraged things will go the other way. It is obvious that the public interest in the Colonies is being overlooked." By now, added our informant, there could have been a one-year trial of Eagle's service, UK approval of which would not have been irreversible.

These were strong words, and they are recorded here because we believe that their author was a moderate and representative spokesman of Bermudian opinion. He concluded by discounting wild suggestions that Bermuda would not notice the difference if BOAC withdrew all its services tomorrow. "We want BOAC," he said, "not only for commercial reasons but because it is a powerful symbol of Bermuda's ties with the old country." And it was wrong to think that Eagle were the blue-eyed boys. "We don't say to them 'Oh you poor little boys, we will look after you.' We say to them 'Come on, get on with it, we want more seats available on this route or that route.' We have powers over their activities and they accepted this when they came here."

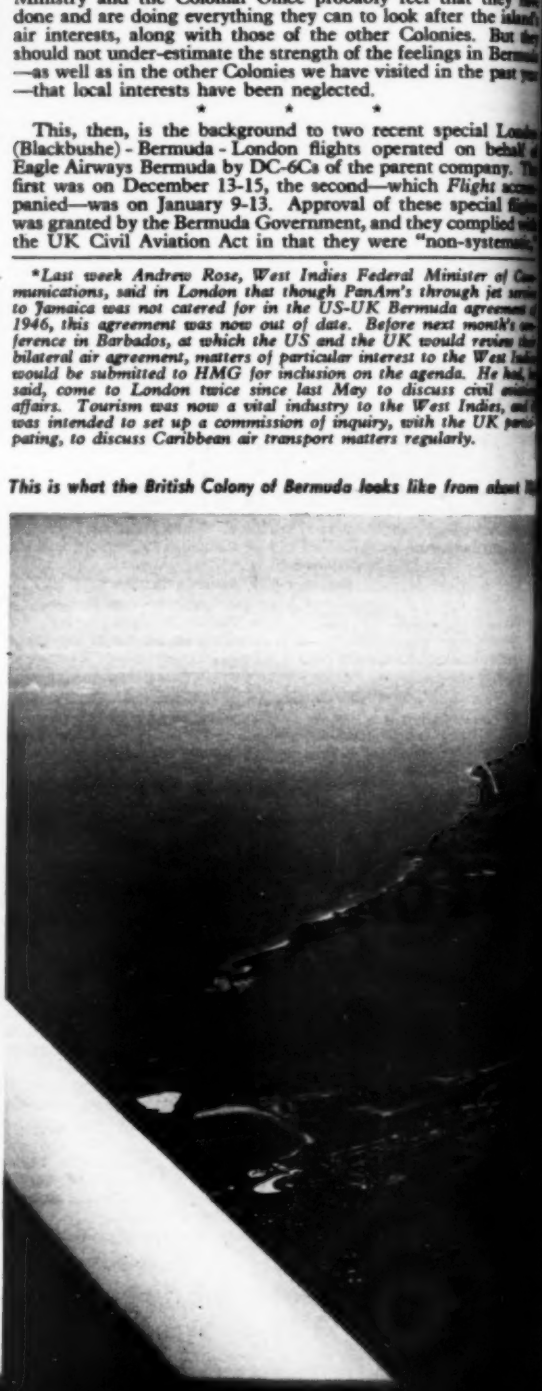
There, right or wrong, is Bermuda's point of view. BOAC, the Ministry and the Colonial Office probably feel that they have done and are doing everything they can to look after the island's air interests, along with those of the other Colonies. But they should not under-estimate the strength of the feelings in Bermuda —as well as in the other Colonies we have visited in the past year —that local interests have been neglected.

* * *

This, then, is the background to two recent special London (Blackbushe) - Bermuda - London flights operated on behalf of Eagle Airways Bermuda by DC-6Cs of the parent company. The first was on December 13-15, the second—which *Flight* accompanied—was on January 9-13. Approval of these special flights was granted by the Bermuda Government, and they complied with the UK Civil Aviation Act in that they were "non-systematic."

**Last week Andrew Rose, West Indies Federal Minister of Communications, said in London that though PanAm's through jet service to Jamaica was not catered for in the US-UK Bermuda agreement of 1946, this agreement was now out of date. Before next month's conference in Barbados, at which the US and the UK would review their bilateral air agreement, matters of particular interest to the West Indies would be submitted to HMG for inclusion on the agenda. He had, he said, come to London twice since last May to discuss civil aviation affairs. Tourism was now a vital industry to the West Indies, and it was intended to set up a commission of inquiry, with the UK participating, to discuss Caribbean air transport matters regularly.*

This is what the British Colony of Bermuda looks like from about [illegible]



"Flight" photograph

Bermuda's civil air terminal. On the right can be seen the fin of BOAC's DC-7C G-AOIG, and taking off is a WB-50 of a USAF weather-recon. squadron

USAF base and civil airport, can be clearly seen

though of course they were available to the general public. They were not charters, and seats were sold as units mostly through travel agents, who got 7½ per cent commission. About a month's notice of the two flights was given. On our flight—the second—we estimated that the average round-trip load factor was about 80 per cent, about 120 passengers. Assuming that 100 of these were fare-paying (there were, we noticed, some guests and Eagle personnel on board), total revenue would have been around £7,000. We imagine that the total cost per hour of an Eagle DC-6C (which are averaging around 3,500 hours' annual utilization) is about £250. Thus the round-trip, which involved 28hr flying, would have just about broken even. Eagle say that VLF is economic, and they seem to be proving it.

Of the flight itself there is little to say except that it was smoothly and efficiently operated by a 24-hour "double-headed" flight crew and a hard-working team of four stewardesses. There was, unexpectedly, full meal service—unlike the proposed regular VLF flights which will be of the bring-your-own-food type. All seats were backwards-facing, and we were interested to learn from Eagle that this never elicits adverse passenger comment. The passengers were judged from a quick mental market survey to be from all walks of life: we met a Bermudian couple and their young son who had been on a month's visit to relatives in England; a woman Bermudian Government official; a parson with a parish in Hamilton; a Frenchwoman, a resident in Bermuda, who was taking her three-year-old niece Dominique home to Paris to her mother; and the chief pilot of a large American domestic airline.

They were a mixed lot, quite ordinary people who obviously appreciated the bargain of a £94 saving in fare, but who otherwise probably knew nothing of the significance of their journey. One asked for champagne, and another wanted to know whether our DC-6C was a "turbojet plane."

Footnote: The Bermuda - London fare of £124 return was arrived at by subtracting from the N.Y. - London return economy fare the Bermuda - New York tourist return fare (this actually works out to £127 15s). Thus the international fare structure, to use the old phrase, would not be undermined. On the question of British carriers playing the game in this respect, we were told that the UK was "much too nice." How about Pan American's fare on the US cabotage route New York - Puerto Rico of $85? If this didn't undermine the Caribbean international fare structure, what did?

A Douglas RB-66B of the 19th Sqn, 10th Tactical Reconnaissance Wing, airborne from RAF Alconbury after servicing there

BASED AT ALCONBURY

Profile of a USAF Reconnaissance Wing

By HUMPHREY WYNN

AS I turned in at the first entrance to RAF Alconbury I reached on the Peterborough-Huntingdon road the white-gloved USAF military policeman saluted. I put down the car window and said: "Wing headquarters?" "Turn right around here," he answered, indicating a traffic-island sign which said KEEP LEFT, "and carry on for about haff a mile. You'll see it then."

It had been snowing, and the level whiteness made the place look more desolate than possibly it really is. Various cars and trucks (one of them with a board on the front, bearing the legend WHISKEY ALERT, a warming thought on a cold morning) looked as they plodded over the white waste rather like parts of Dr Fuchs' Antarctic expedition. In the distance was a hangar, but nearly all the aircraft were dispersed in the open—chiefly RB-66s, looking with their pronounced anhedral rather drooping and melancholy, as if feeling the cold. There were a couple of C-47s, with fluorescent red noses and similarly glowing outer surfaces; and in the distance some white Valiants and Victors. These V-bombers were from RAF Wyton, which is only about five miles away; they have been lodging at Alconbury while work was undertaken at their own airfield, used by aircraft of the Central Reconnaissance Establishment. Then I came to a clutch of one-storey buildings, including a PX store, and Old Glory and the Union Jack flying side by side in an icy breeze from the North. Over the main entrance of a line of offices opposite the car park was a badge with a circle of stars, an eagle and a globe in the centre, and underneath the legend: "10th Tactical Reconnaissance Wing." I went inside to meet Capt Robert M. Bussjaeger, who is the Information Services Officer and responsible for all publicity on "the base": my day at Alconbury, an informative glimpse of how the USAF works in a foreign land, had begun.

Only since last August has Alconbury been the 10th Tac Rec Wing headquarters, when it moved from Spangdahlem in Germany in the shuffle-round which followed General de Gaulle's refusal to have aircraft with a nuclear capability operating from French soil if they were not under French control. Alconbury had bomber and meteorological units up to that date: the 47th Bomb Wing (Tactical), 86th Bomb Sqn, and the 53rd Weather Reconnaissance Sqn—"The Falcons"—about whose activities *Flight* published an article on June 5 last year. As the squadron was previously at Burtonwood, and is now at Mildenhall, USAF falcons may be said to fly from peripatetic fists.

In his office, one of several devoted to "information services" and the production of a fortnightly newspaper (RAF, please note), Capt Bussjaeger gave me a pale grey folder containing information on the 10th Tactical Reconnaissance Wing—*Alconbury, Bruntingthorpe, Chelveston . . . the ABCs of Tactical Reconnaissance*—and told me about the other units at Alconbury. To cheer on the cold morning he brought me a cup (cardboard) of coffee made in an office across the corridor: percolators, sugar dispensers and cream were as native to Alconbury, I found, as samovars to Russia.

Col James D. Kemp, commander of the 10th Wing (seated), with his deputy commander, Col Victor N. Cobas. The medal ribbon over the right breast pocket is the Distinguished Unit Citation awarded to the Wing for its D-Day operations and worn by all personnel

There are four tenant units there in addition to the Wing: an EOD (explosives and ordnance demolition); AACS (airways and air communications services, which includes flying control); communications squadron (responsible for signals and certain radio communications); and a weather detachment, i.e. forecasting office. At Molesworth there is a hospital, this and all 10th Support Units coming under the 10th Air Base Group (Col Henry S. Taylor). This group exists to support the Wing, which is under the command of Col James D. Kemp and has four squadrons. These are all equipped with RB-66s (reconnaissance version of the Douglas Destroyer) and two of the squadrons, the 1st and 30th, are at Alconbury. The other two, the 19th and 42nd, are at Bruntingthorpe (65 miles away) and Chelveston (22 miles) respectively. At Spangdahlem the Wing was self-contained.

Col Kemp, a solidly built Nebraskan who has commanded the Wing since July last year, told me something of the problems involved in the move from Germany to the UK. The Wing had been at Spangdahlem (one of the bases built since the war to NATO specifications) for five years, so the change meant a considerable uprooting. Even allowing for American quickness, it had taken a month or so to settle in at Alconbury and its associated stations; but now most of the domestic problems had been got under control and a big building programme was under way, including the construction of a gym, commissariat building and a chapel. One difficulty, after the long hot summer of '59, had been a shortage of water—not for drinking but for photographic developing purposes. Alconbury airfield, originally a satellite for Wyton and next door to the tiny village of Alconbury Weston, was never envisaged as having a population of 3,500. But this problem, Col Kemp intimated, was in process of being liquidated and the shortage would not recur—even in such dry summers as we enjoy (occasionally) in England. Other building projects at Alconbury include a new hangar (most of the time the 55 or so aircraft at the base stand out in the open). There are no plans in prospect for lengthening the 9,000×300ft runway.

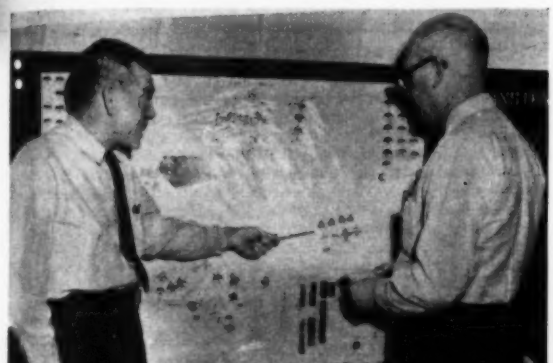
On the corners of Col Kemp's desk are two mounted model aircraft. One, naturally, is an RB-66; and the other a Handley Page Victor. The latter model was presented to him recently by Gp Capt C. D. North-Lewis, who commands RAF Wyton, in recognition of Alconbury's accommodation of the temporarily displaced Victors and Valiants of the CRE. Such co-operation between Wyton and Alconbury is of constant occurrence, particularly in air traffic control; and historically the two stations have been connected ever since Alconbury was surveyed before the Second World War.

It was originally intended (in 1938) to be a satellite for Upwood, which is slightly farther away than Wyton; but became one for the latter airfield, the first wartime operations from Alconbury being undertaken by Wellingtons of No 40 Sqn on

detachment from Wyton. This squadron subsequently went to Malta and from what was left of it a new unit, No 156 Sqn, was formed at Alconbury in February 1942. Later that year No 156 moved to Warboys; Alconbury ceased to be a satellite of Wyton and in 1943 became one for Molesworth. That June a new chapter in its history began, when the 8th USAAF moved in and Alconbury became an American base for the first time.

Perhaps the part which American aircraft from there played in the European bomber offensive is best described in the words of a USAF officer who summarized it recently by saying that Alconbury "was instrumental in the success of the daylight bombing raids against the Axis, for stationed there was the 482nd Bomb Group, the first USAAF Pathfinder unit in Europe. Besides flying combat missions, the 482nd operated a school for radar pathfinders at Alconbury. They led the majority of the biggest and most famous raids and played a very important role during the D-Day operations."

Alconbury, then, has largely an American history; for after it had been on a post-war care and maintenance for some nine years,



SM/Sgt Charles W. Foster, NCO I/C Job Control (left), and the senior controller, T/Sgt Carl Walker, at the board showing the maintenance state of aircraft in the Job Control Unit

the USAF took it over at the beginning of 1954 and a building programme was started. Units there prior to the 10th TR Wing's arrival from Germany have already been mentioned. Now they have gone, Alconbury has re-assumed its American accent with a new dimension of activity.

The Wing's object is officially described as to "gather visual, photographic, weather and electronic reconnaissance information and present it in usable form to the air, ground and sea forces of the NATO alliances." Under peacetime circumstances the Wing comes under USAFE (US Air Forces in Europe) headquarters, but in war would be controlled by NATO. Three of the Wing's squadrons—those at Alconbury (the 1st and 30th) and the one at Bruntingthorpe (the 19th)—are primarily responsible for visual and day and night photographic reconnaissance; while the 42nd Sqn, at Chelveston, is responsible for weather and electronic (i.e., radar) reconnaissance.

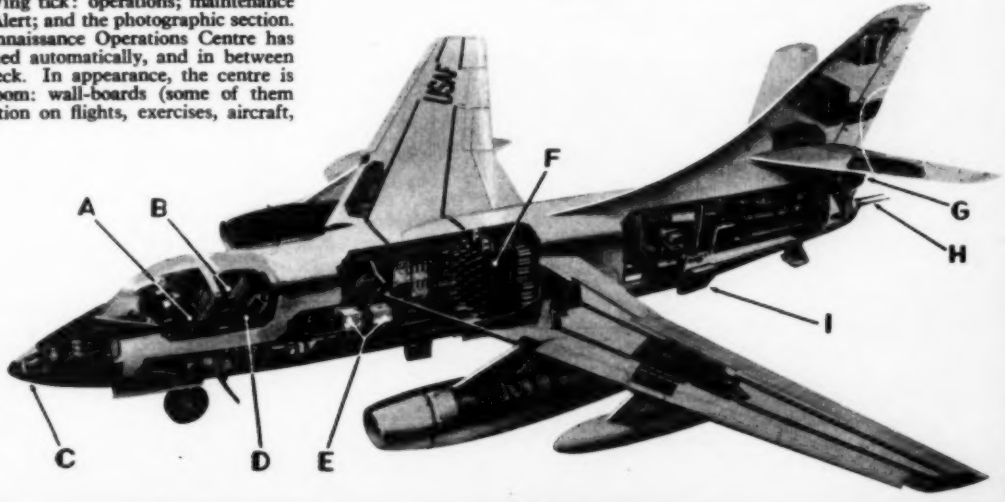
Under Capt Bussjaeger's guidance, I visited those parts of Alconbury which make the Wing tick: operations; maintenance and control centre; Whiskey Alert; and the photographic section. What is known as the Reconnaissance Operations Centre has double doors which are opened automatically, and in between which there is a security check. In appearance, the centre is much like any operations room: wall-boards (some of them curtained off) giving information on flights, exercises, aircraft, weather; a long control desk in front of these boards, with the usual battery of telephones; and at the back of the room, a secluded glass-surrounded area raised above floor level and containing easy chairs and a table with telephones. One of the duty officers, Maj P. V. Howell, explained to me how the centre "co-ordinates and controls tactical flying operations." These are of several kinds: photographic and visual reconnaissance, at high and low level; in-flight refuelling (by KB-50s); weather flights; and training sorties. Additionally the centre compiles operational data for higher command use. So that it can carry out these tasks, the centre must have up-to-the-minute information on the crews and aircraft of the four squadrons it controls; and this is displayed on the boards, aircraft being matched against crews.

In addition to its reconnaissance role and the probing of radar defences, the 10th Wing flies weather sorties daily to the Mediterranean area and deploys its aircraft for training to Moron, the USAF base in Spain some 15 miles south-east of Seville. Aircraft on meteorological flights (from the 42nd Sqn, at Chelveston) form a regularly rotating pattern, going to Wheelus AFB, near Tripoli in Libya, thence to Moron and back to Chelveston: aircraft and crew night-stop at Wheelus and Moron, so each day there are three RB-66s airborne on this meteorological triangle. What Maj Howell referred to as "productive training" is carried out by the Wing at Moron. "We put 18 aircraft down there altogether within a week," he said. From Moron, the crews do approximately 15 hours' flying on training or operational missions, aided by the generally good weather prevailing there. All sorties by the Wing, whether operational or training, are controlled from the Alconbury operations centre, which the major described as "the focal point for alerting the entire Wing." At briefing prior to an exercise, officers with responsibility for all relevant sides of activity—maintenance, navigation, meteorology, intelligence, etc—gather to provide relevant information. But air traffic control is done by Wyton.

Mention has already been made of the close association between Wyton and Alconbury, and because they are so near physically a joint control of aircraft going in and out of the so-called "Huntingdon complex" is essential for safety. The description by Maj Howell of this unified ATC amplified one which had been given to me earlier by Wg Cdr R. E. Dyson, RAF liaison officer at Alconbury, who made the interesting comment that "it just happens that Wyton is doing a similar kind of work to Alconbury—though the Americans didn't know that before they came here." He added: "It helps, in the complex, to have aircraft which operate at the same speeds."

Wyton and Alconbury aircraft carry common crystals and each station is allotted a "block" time for departures and arrivals: "You don't interject a Wyton aircraft into an Alconbury block time," said Wg Cdr Dyson. There are tele-talk lines between the airfields' control-towers and operations centres are connected by tie-lines. Controlling is done by Wyton, and if an aircraft wishes to take off from Alconbury, it is not allowed to go until the Wyton complex is clear: thereafter it is under Wyton control until the end of its block time, and on its return until it comes under ground approach control. In this routine, as Maj Howell described it, "Every aircraft must come back and meet a specified beacon time—given by Wyton—within five minutes. If an aircraft is late, it has to call Wyton for a new beacon time."

If the Reconnaissance Operations centre is the heart of operations from Alconbury, Bruntingthorpe and Chelveston, the nerve-centre is the Maintenance Control Centre presided over by Maj E. H. Gordon. Its innermost sanctum has the same look as an operations room—wall-board packed with names and numbers, centre desk stacked with telephones; and in a small room at the back there is another miniature operations room, with airfield plans on the wall, from where the movements of vehicles



This sectioned picture of an RB-66 shows at (a), (b) and (d) the pilot's, navigator's and gunner's positions; (c) navigational radar; (e) cameras; (f) photoflash bombs; (g) scanner for gun radar; (h) 20mm guns; and (i) JATO bottles. The engines are Allison J71-A-13s

Maintenance personnel being dispatched by R/T and requests posted on status boards in the Job Control Unit by S/Sgt Paul Redfield, aircraft maintenance squadron dispatcher (left); T/Sgt L. S. Pinkerton, senior controller; and T/Sgt Robert Smith, A & E dispatcher

BASED AT ALCONBURY . . .

and men and spares are controlled. The crux of the system, as Maj Gordon explained it, is to get the best use out of the men he has available by employing them as required on any aircraft on the airfield. Thus the squadron commanders do not control their own groundcrew (except in matters of administration). This is in sharp contrast to the RAF practice which prevails in the V-force of Bomber Command, whereby each aircraft has its own groundcrew working under the supervision of a crew chief. Under the "66-1" management system, as it is called, Maj Gordon has about 1,400 men at his disposition.

Maj Gordon's organization has four branches:— maintenance control, responsible for supplies and workload; maintenance standard and training ("if a new modification is known, they go out and do it"); quality control ("inspectors, if you like") doing spot checks on aircraft and every 90 days a check on maintenance facilities at the base; and analysis records and reports ("each man has a card every day showing how much time he doesn't spend on his job").

The whole system depends for success not only in keeping as many aircraft serviceable as possible (the end-product of any air force's or airline's maintenance service), but also in being able to tell at a moment's notice exactly how many are flyable.

This is where the maintenance control centre at Alconbury is visually effective: the mass of information on the boards supplies quick answers to eyes trained to read it; the radio control of groundcrew, with each man reporting as soon as he has finished a job, means that technicians can quickly be re-employed as necessary. Apart from about 40 RB-66s, there are 11 T-33s (used for familiarization, local weather flights, some communications) and four C-47s to look after at Alconbury. Maj Gordon has to issue daily and monthly reports on serviceability states, and prepare information for a weekly commanders' conference.

With aircraft directed by operations and serviced by the maintenance organization, the two other components of 10th Tactical Reconnaissance Wing work are its photographic equipment and aircrew.

Capt S. G. Upchurch, a photographic officer, explained that the RB-66s carry three night cameras (K46) and a day camera (K38). The set of three is, however, being replaced by two. "One exposure in two seconds is not fast enough," explained the captain. "Two cycles per second we consider as slow as we can manage." Three types of lighting are used by the RB-66s for night photography: a photo-flash bomb for high level work (say about 12,000ft); and a small flash cartridge for low-level in series and electronic flash for low level. From next Monday (February 1) aircraft of the 10th Wing are taking part in the big military exercise *Winter Shield* on the Continent, operating by night; and in May they are participating in *Royal Flush V*, the annual photographic reconnaissance competition between aircraft of the 2nd and 4th Allied Tactical Air Forces.

Crews who are on three-day stand-by, known as Whiskey Alert, at the 10th Wing base live together near dispersal and are never out of call for the whole of the period. (Normally an RB-66 crew numbers three: pilot, navigator and gunner; but in other roles the aircraft may carry more—five for weather sorties and seven on electronic flights.) The Whiskey Alert quarters seem as comfortable as one could wish under the circumstances: a well-stocked refrigerator, plentiful supplies of food, a dining-room and reading-room, games, TV. Sleeping accommodation is provided in comfortably appointed caravans, and if the hooter goes it is reckoned an aircraft can be got off in a matter of minutes. Capt B. D. Beverly, a pilot with whom I talked, said that no pilots went on to RB-66s with under 1,200hr experience and having usually done one or two operational or instructional tours. He spoke highly of the Douglas product as "a very forgiving aeroplane" and said that on a sortie of three hours or so the roomy cockpit gave reasonable comfort to a pilot.

During this visit to Alconbury, I had lunch with Capt Bussjaeger in the officers' mess and found certain features extremely interesting (and typically American): the generous supply of coat-hangers in the hall; the cafeteria system, with its choice of beef (underdone) and vegetables, or beef sandwich, or hamburger, and small bottles of milk or coke or beer; the partition separating the dining-hall from a meeting of the Wives' Club next door. And where in the RAF (or Royal Navy or Army) would you find the mess manager going round smoking a cigar as he superintends operations, or a master-sergeant looking like Sgt Bilko with horn-rimmed glasses and a fat cigar in a small holder, or a colonel who is escorting a general slapping a passing major on the back and saying "Hiya, Bill!" In many respects there is considerable informality about American behaviour, even in uniform; and the small glimpses I saw of it at Alconbury I found refreshing. Certainly it does not seem to impair efficiency: the 10th Tactical Reconnaissance Wing appears to be a thoroughly businesslike organization, with a keen sense of purpose about its operational function.

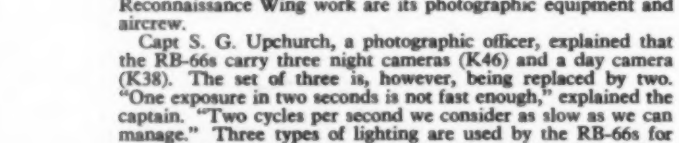
RB.146-POWERED FOR EXPORT

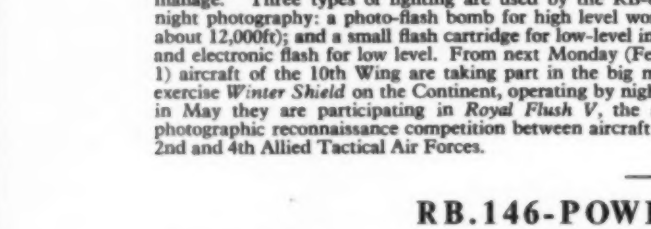
SWEDEN and France are each developing outstanding delta-winged, multi-mission combat aircraft capable of twice the speed of sound. The makers of both these aircraft have now announced that their export versions will have increased performance, confered by the installation of a Rolls-Royce RB.146 engine. Revealed at the SBAC show last autumn, the RB.146 is rated at 13,220lb dry, and much more with reheat, and evidently incorporates a zero-stage (RA.29) compressor.

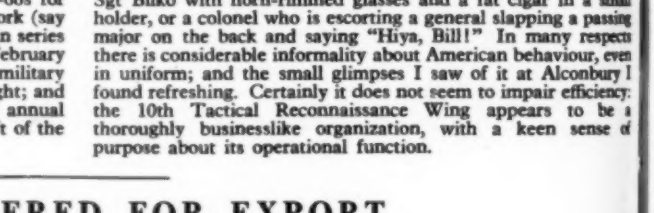
In the Saab-35 Draken, the RB.146 is fitted with a Svenska Flygmotor afterburner; and the improved aircraft, designated J35B and also fitted with the Ferranti Airpass 2 radar fire-control, has already exceeded M2 in level flight.

The other application is the GAMD Mirage III, which has already exceeded M2 on many occasions on the power of an Atar 9, and with the RB.146 has even higher performance. It is worth noting that another GAMD product, the Etendard 4M, has also been fitted with a Rolls-Royce engine, in this case an Avon RA.51.

Finally, it is appropriate to note that the exhibition RB.146 displayed at Farnborough was marked "upper engine." It is but a short step from this to the conclusion that the engine will power the bulk of the English Electric Lightnings for the RAF.







The Rolls-Royce RB.146 (left) is to be fitted to export versions of the Draken (below left) and Mirage III (below)

Straight and Level

"TAKE a long close look at BEA," runs a recent newspaper advertisement. One of the reasons why you should buy your air travel from BEA, the advertisement suggests, is that it is "a national airline, responsible for its actions to Parliament, and thus to the people of Britain." BEA, the ad. goes on, is your airline, and its duty is to provide you with the efficient air service you need. Furthermore, the corporation has made a profit for five years running.

I think people will be impressed by this image which BEA is projecting of itself. Here we observe "institutional" airline advertising, which sells seats by selling the institution. And you may have noticed the stylish imagery of red, black and white which consistently appears on everything BEA in the public eye.

But the phrase "responsible to Parliament" sets me wondering.

* * *

BEA, like BOAC, is by statute responsible to Parliament through the Minister of Aviation. I am beginning to wonder just how much Parliament really cares.

BEA laid its annual report and accounts for the year ending March 31, 1959, before the Minister on July 29, 1959. BOAC put theirs on his desk on September 26, 1959. These reports should by now have been debated by Parliament, but they have not. They were now and again referred to on December 15 in a debate about the corporations' borrowing powers—a debate which rambled on about all sorts of general matters—but they were not looked into as thoroughly as they should have been.

Is it not time that Parliament got around to a serious debate on the corporations' reports? I hope they will do so soon after the recess. It is little short of astonishing that no MP has ever called the Minister to account for the fact that BOAC really lost £11¼ million in 1958-59, and not the £5 million it declared. The missing £ms were noted by the Press (*Flight*, October 30, p. 479; November 6, pp. 483 and 488), but no satisfactory explanation has been given. Perhaps MPs, like the directors in *Parkinson's Law*, cannot grasp the immensity of such sums—though they will debate interminably such matters as "the extraordinary anomaly in the tax on buttons and zip fasteners."

● To humour a potential customer is always worth while. Equally it is important to put him in a good humour. A colleague who has had a two-hour briefing session on the D.H.121 at Hatfield reports that the sales team have come up with a gimmick that should have real customer-appeal. After the 121 presentation is concluded two members of the team take the rostrum to propound the merits of a transport aeroplane—the Guardsvan—of their own design. And when D.H.s set out to pull their own leg they do it in style.

Thus (from the commentary): "This aircraft is intended as a replacement for the now obsolete Vanguard, 707, 121, 341, 303 and the 10.15 from Waterloo calling at Oxshot, Bagshot, Didcot and all stations to Chipping Sodbury."

Having made allusion to the "diplomatic male locker," located beneath the stairs, the briefing continues: "Bunks are fitted which may be interchanged with beds of nails in the event of an Air-India order."

The Guardsvan has silence amplifiers, which supersede the old-fashioned noise-suppressors. They are designed to broadcast a record of absolute silence during take-off, thus completely drowning the noise of the engines.

● A *Flight* colleague recently in Bermuda, where he was gauging the market for lower air fares, heard something about the market for lower shipping fares.

The American hotel tycoon, H. B. Cantor, is apparently still planning to build two 6,000-passenger "superliners." With these he proposes to offer a $50 transatlantic fare. Amenities would be kept to the barest minimum—meals, for instance, would be served in a cafeteria at extra cost. It would be real "no-frills travel for the masses."

Mr Cantor was asked about diversion of traffic from the established shipping lines—the old bogey that always holds up the introduction of low air fares. To this he is said to have replied to this effect: "Diversion? Nonsense. My ships will actually increase the established lines' business. You see, my passengers will travel superliner one way, and they'll find it so rough they'll come back on the *United States*."

And I liked the comment of an American reporter after Mr Cantor's press conference in the Hotel Dixie, New York. "This guy's so crazy," he said, "he almost makes sense."

● The one thing that Decca has which other navigation systems haven't is pictorial presentation. Pilots prefer to fly by a map, and not by a set of needles. VOR is a good device; no one will deny that. But so is Decca, and it looks more to the future. And it provides the pilot with a much better idea of where he is going than VOR, which says only: "Rho-Theta from Kasawaski" and "Rho-Theta from Oshkosh.S.Dak."

Decca might not yet be perfect. But at least it is based on presentation principles which are more adaptable to modern flight deck work than are clocks and dials and needles—of which, goodness knows, there are enough already.

So if any of our children decide to become intrepid civil type birdmen at £10,000 p.a. (*circa* 1970) we must insist that *they* insist that all navigation information be presented on a 2ft map. Negative to needles and dials, I say, and ten out of ten to pictorial presentation.

The top execs. use downtown Burke Lakefront Airport, Cleveland, Ohio, for business trips. The seagulls use it for fishing. Which is what the execs. would rather be doing anyhow. Yes sir, that's a regular English Dove airplane right in there commuting

● I remarked the other week how the Americans and the Russians seem to be making a kind of sporting event out of breaking records with fighters having supposedly secret performances. But my imagination just couldn't have been trying. I quote a Reuter message:—

"Washington, Jan. 15. The magazine *Missiles and Rockets* reported today that the US Defence Department was considering a proposal that the United States challenge the Soviet Union to a Missile Shooting Match in the Pacific Ocean."

Can't you see it . . . ? "World Series. Canaveral Cats v. Red Rocketeers. SAC Sox Marx in Pac."

Must Be Operational

● "Film Company needs three of the following World War Two bombers for The Guns of Navarone: Lancaster, Halifax, Mitchell, Liberator, Stirling, Wellington, Boston. Also one Heinkel or one Stuka. All must be operational.—Phone Mrs. Hussain, Shepperton Studios, Chertsey 2611 x 122."—Advertisement in the *Daily Telegraph*.

ROGER BACON

Oldest Aeronautical Society

THE STORY OF THE RAeS: PART 2

By FRANK H. SMITH

THE last of the annual reports was in 1893 and in the concluding remarks one reads names that are historically familiar today. Chanute, Horatio Phillips, Graham Bell, Langley, Maxim—all strike chords in the memory and make one realize that powered flight was now getting nearer accomplishment.

By 1896, however, the Society was in a sorry state. Letters of resignation were received from the Duke of Argyll, the Duke of Sutherland and others. The accounts showed a credit balance of five guineas; and the final item of the council minutes reads: "A vote of condolence was passed to Mrs Brearey." Capt B. Baden-Powell was asked to succeed F. W. Brearey as hon secretary, and consented to do so.

That was on November 30. At the next meeting, on December 19, it was resolved to hold a meeting in the following March, to issue the *Journal* quarterly if possible and to authorize the hon secretary "to purchase any books for the Library of the Society." All this on five guineas.

The first *Aeronautical Journal*, dated January 1897, opened with an editorial giving a short account of the Society's rise and near-fall. It tells of the arrival on the scene of names like Lilienthal, Maxim, Langley and Chanute. "Numbers of new members flocked to the standard. The crisis had passed! The true life-blood flowed again. The invalid has risen from its bed fresh and invigorated. May it thrive on, and grow into a healthy adult!"

THIS is the second part of the history of the Royal Aeronautical Society—which recently celebrated its ninety-fourth birthday—as recorded from the pages of its Journal by the present librarian. Part 1 appeared in "Flight" for January 15.

The first number contained the obituary of the faithful Brearey (whose name in the index is given as Briarey) and it would have been sad, indeed, had there been no publication of the Society in which to record the thirty years' service he had given to it. There was also an account of the death of Lilienthal. The number concluded with an interesting list of contemporary articles on flying in other journals. No price is given for this number, but the next, in April, quotes the annual subscription as 8s for the four numbers. The *Journal* evidently soon got into its stride, for the second issue carried articles by Pilcher and Hargrave (from the Royal Society of N.S.W. *Proceedings*) and notes on experiments taking place in other parts of the world. This journal, by the way, was a gamble by Baden-Powell, who undertook to finance it personally. Council meetings were averaging three members, which made the conducting of business fairly speedy. One member was the chairman and one was the hon secretary.

In the July 1897 *Journal* a paper by Maj J. D. Fullerton of the Royal Engineers, on "Flight and Flying Machines—Recent Progress" finished with a six-item summing-up, the last item of which read "Warfare by sea and land, on any extended scale, will only be possible to the nation which has command of the air."

Despite its shoestring start, the *Journal* appeared as Volume II in 1898 and of the two members announced in the first number as being appointed to the council one was Percy S. Pilcher. A report on the previous December's general meeting carried the words: "The proceedings commenced with a statement by the Honorary Secretary (Capt. Baden-Powell) as to the satisfactory condition of the Society. . . ." The Society was still reprinting the papers that Hargrave was reading to the Royal Society of N.S.W. One day, perhaps, an authoritative biography will be written of this man who, far from the centre of things, was doing so much quiet research on his own. In the July 1899 number of the *Journal* was a report of a meeting held on May 20 at which Hargrave himself read a paper to the Society. In the chair was the president, Percy S. Pilcher. The next number (October) contained an account of Pilcher's death.

January 1900 reported a deputation (including Sir William Crookes, FRS, and Mr Hiram Maxim—soon to become Sir Hiram) from the Society waiting on Capt Baden-Powell of the Scots Guards at Chelsea Barracks on October 21 to wish him farewell on his departure for South Africa to fight the Boers. Propaganda was not lacking; the deputation hoped the war would afford him an opportunity to try out his war kite. It should, perhaps, be mentioned here that the Society's Baden-Powell was a younger brother of the more widely known B-P.

In the October (1900) number there was notice of a letter, dated June 17 from Mafeking, in which Maj B. F. S. Baden-Powell resigned his post as hon secretary of the Society. Eric Stuart Bruce succeeded him. Comment in the *Journal* truly said that the news was received with regret; Baden-Powell had found the Society in a very shaky state and by his own efforts, and with his own money had breathed new life into it and into the *Journal*. He was made president—a well deserved honour.

At this time the *Journal* carried many reports of airship construction, particularly in Germany (Baden-Powell had written an account of the Zeppelin as early as October 1899). In one of these items the Society, with its passion for accuracy, pointed out that where reports had been current that the Zeppelin had journeyed 35 miles against the wind, this should read 3.5 "the decimal point having escaped the notice of the telegraphists." The closing paper of 1900 was "Lifting Power of Air Propellers, being Experiments with Propellers 30' in Diameter."

In a congratulatory notice to Sir Hiram Maxim (January 1901) on his knighthood the *Journal* said: "Sir Hiram Maxim has won world-wide renown for the automatic gun which bears his name, but perhaps it is his Flying Machine that will secure him still more enduring fame." In the same number is a report of the Paris International Aeronautical Congress at which it is "regretted that Great Britain contributed comparatively few names to the list of the members." A note in the April number of the Society's address (19 Campden House Road, Kensington) reminds one that the Society was still without any rooms of its own. Its meetings had, almost without exception, been held at the Society of Arts, Adelphi.

The *Journal* for July 1901 carried the following notice: "RESOLVED, that Mr. Patrick Y. Alexander's offer to financially assist the Aeronautical Society to the extent of one hundred pounds per annum for five years should be accepted and the warmest thanks of the Council should be conveyed to Mr. Alexander for his most generous gift." An excellent resolution, even though they did split an infinitive in making it. The same number contained an article, "Angle of Incidence," the author of which was a gentleman named Wilbur Wright. One wonders if they guessed. It is distressing to note that in October 1901 it was resolved that New Rule VI, providing for the admission of associate members at five shillings per annum, be rescinded. In these days it was the custom to read the council minutes at general meetings and at the July 15 meeting the chairman, after

the minutes had been read, remarked that though the Society was at one time down to 4s 6d it now was £150 to the good.

Among the names of "gentlemen elected members of the Society" listed in January 1902 appear The Hon C. S. Rolls and Mr Alexander Ogilvie. The latter is still with us. The first paper of the session was "Aerial Navigation by Bodies Heavier than Air," by Sir Hiram S. Maxim, in which he described his famous Baldwyn's Park experiments. "It is difficult to learn the art of flying without actual practice in the air, and the actual management of a machine in the air, no matter how perfect, will require quite as much skill as is required to ride a bicycle. . . ."

In October 1902 the Society welcomed back their president, Maj Baden-Powell, and a deputation from council met him at

At the close of the Victorian era one of the liveliest forces in the Society's affairs was Capt (later Maj) B. Baden-Powell, who was hon secretary from 1896 until 1900. During his service in the Boer War he was elected president. He was a younger brother of Sir Robert Baden-Powell, founder of the Boy Scout movement

Victoria Barracks, Windsor, with an illuminated address saying how glad they all were that he was back. The name of James Glaisher appears among the list of those present. The Society at last has its offices and library at 53 Victoria Street and "after the Library has been duly catalogued and put into order at the new premises arrangements will be made for it to be open to members on stated days for reference, due notice of which will be given." Those were the days! One notes that in this last number of 1902 there is a paper on the performance of a "Bristol" war balloon. Some names do stick around.

At the opening meeting, the balance was announced as £204 5s 1½d, a further example of the Society's passion for exactness. Baden-Powell read a paper on "The Future of Aerial Navigation," concluding: "Then I feel sure it would not be long before the British nation would owe a debt of gratitude to the Aeronautical Society of Great Britain." In the April 1903 number mention is made, in a list of members elected, of Griffith Brewer. The name is noteworthy in view of its owner's friendship with the Wright brothers, whose efforts were so soon to become part of the Society's history. April, too, contained the obituary of James Glaisher, who had died at the age of 94 on February 7. He had, indeed, been one of the Society's cornerstones or, better, one of the rocks on which it was founded. July 1903 saw the announcement of election of S. F. Cody; and we all know how long it has taken to clear up *his* first flight. The same journal carried a description of the International Kite Competition, a contest to be won by height. The required altitude was in excess of 3,000ft, but as nobody managed this the silver medal was withheld. A Mr Charles Brogden did best with 1,816ft.

An epoch-making announcement in the January 1904 number told members that the library was to be open for reference and borrowing on the first Monday in the month, from 2 p.m. to 5 p.m. There was a paper on the use of the balloon in the British Antarctic Expedition by a Lt E. H. Shackleton, RN, but still no hint of what had been going on at Kitty Hawk the previous December. Then, in March, after a lecture by Thomas Moy on mechanical flight, the president announced: "We are now to have some photographs thrown on the screen descriptive of the gliding experiments of the brothers Wright. Most of you know about the brothers Wright . . . how they have been making some very good glides and how just lately they have applied a motor to their machine and made some very successful experiments in rising off the ground into the air." Then follows, in the *Journal*, "The Experiments of the Brothers Wright." It is in two parts, Part I "With Gliding Machines depending upon Gravity for their Motive Power" and Part II "With the Power Flyer—Communicated by Mr. Orville Wright."

The *Journal* for October 1905 recorded the death of Stringfellow. At the meeting of December 15 in that year Mr Alexander read a letter from Orville Wright, giving an outline of the brothers' efforts to date. In his comments afterwards the president said: "To remain half an hour in the air seems extraordinary." In a discussion on a paper on the work of the Wrights, given by Maxim, one notices the name Moore-Brabazon. This is in July 1906. But the papers read to the Society were still mainly about balloons, kites and meteorological conditions; none of them seems to convey any realization that powered, heavier-than-air flight had actually been accomplished. In a paper on the Santos-Dumont machine, Bruce, the secretary, made a plea that the Society should not forget its background: "In what better way could we keep our jubilee than by showing the world that the work of 50 years has brought us near the goal?"

January 1908 saw the publication of papers on "The Starting Methods of Aeroplanes" by Jose Weiss ("Imagine yourself possessed of a perfect aeroplane capable of taking you to your intended destination, Manchester, for instance. In the present state of affairs what will you do for a landing when you get there?") and "A Study of Model Gliders" by one A. V. Roe.

At the end of 1907 Bruce resigned the hon secretaryship and Baden-Powell the presidency. The *Journal* for July 1908 contained two interesting papers. One was by Octave Chanute, on "Recent Aeronautical Progress in the United States"; the other was "Notes on the Phillips Flying Machine." This refers to Horatio Phillips, to whom credit for the modern aerofoil is usually given. Wenham, too, was still supplying papers to the *Journal* at this date and at the age of 85. In the next number is an announcement of his death.

In the January 1909 number is a list of those elected members on November 9. A. P. Thurston is one name still with us, but right at the end are two others—"To be honorary members—Mr Wilbur Wright, Mr Orville Wright." Rules are laid out for the submission of papers and among those listed as serving on the "travel exhibition" is the chairman, F. Handley Page Esq. Later there is a letter from Wilbur accepting on behalf of himself and his brother the Gold Medal of the Society. Other features of this "bumper" number are a paper by Lanchester, "The Wright and Voisin Types of Flying Machine"; Baden-Powell on "Experi-

In this historic picture from the RAeS files Wilbur Wright (standing) is seen at the May 3, 1909, meeting at which he and his brother were presented with the Society's Gold Medal. Orville's face is seen in profile near the centre of the wall panel. The patriarchal figure on the extreme right is Sir Hiram Maxim

The experimental ground at Dagenham (1909 photograph at left) "was not one of the Society's outstanding successes"

OLDEST AERONAUTICAL SOCIETY . . .

ences with the Wright Machine"; Cody on "Experiences with the 'Power Kite' "; and a report of the Society's "Wings Committee." A truly auspicious start to what was described fifty years later, with reference to aviation as a whole, as *annum mirabilis*.

In April was published Baden-Powell's report on the Society's experimental ground, the address of which was given as Dagenham Dock. This was not one of the Society's outstanding successes. At the Aero and Motor Exhibition in March there were several aeroplanes exhibited by names that are still household words—Moore-Brabazon, Handley Page, Short, A. V. Roe. On May 3, at a general meeting, the Wright brothers were presented with the Society's Gold Medals. Long speeches preceded the presentation but the brothers were brief—Orville more so than Wilbur. At the council meeting of August 18 Cody was awarded the Silver Medal. This, according to his letter of acknowledgment, surprised him.

In 1910 the editorship of the *Journal* was between Hubbard and Ledeboer, the price was increased from 4s per annum post free to 6s plus 6d postage, and the advertisement agents were changed. Col Fullerton, the hon secretary, enumerated some points for the advancement of the Society which included, in the January number, an outline of committee work; and a list of "First Aeroplane Flights throughout the World" gave Ader's name on October 17, 1897, and that of the Wrights on December 19 (sic), 1903.

A full report of the Council's Report in the April number makes rather more interesting reading than did previous ones. There seems to have been some querying of the expenditure and a little trouble over another body called the Aerial League (the secretary of which was a Mr Marples). The election of council, too, came in for criticism. The same journal carries a short description of the Society's stand at the second International Aero Exhibition at Olympia, where "the reception room proved a great convenience to the members. . . ." At this time more and more descriptions were appearing in the *Journal* of flying machines and the accompanying photographs are a record of the early years' progress. The Dunne biplane may be taken as a typical example. This illustrated the second of a series entitled "Members' Machines." In October was announced the award of the Gold Medal to Chanute—surely one of the first of the "backroom boys." He died in November, just under a month after receiving the medal in America.

The forerunner of the present BSI *Glossary of Aeronautical Terms* appeared as the preliminary report of the Society's Technical Words Committee in January 1911 with 38 words: "Shed —The use of the term *shed* is recommended instead of hangar." "Helmsman—In charge of the steering." Many of the terms, however, still stand today.

The annual meeting for 1911 is reported in April and dismissed with the words, "a prolonged discussion took place." The upshot was that the ballot was not declared and a committee of inquiry was formed "to consider the position of the Society and make suggestions with a view to the benefit of the Society. . . ." In July 1911 was reported the result of the committee's deliberations; they agreed:—

"(1) That it is necessary to the financial welfare of the Society that the Society should attract the support of all those interested in Aeronautics, irrespective of their technical qualifications.

"(2) But that it is equally necessary to the standing of the Society as the officially recognized body dealing with the *science* of Aeronautics that the constitution of the Society should include a technical side, to which none but those qualified in the science of Aeronautics shall be eligible, and admission to which would, therefore, automatically confer a technical status on those elected."

Items 3 and 4 dealt with a postal ballot for the "Governing Body" and limiting members' liabilities. A special general meeting was convened on September 25, 1911, to repeal the old rules and substitute the new. No fur flew.

About this time the *Journal* was publishing letters from correspondents in various parts of the world which gave the state of aeronautics in the places where they were living. A letter from George A. Taylor in Australia gave the first flight there as having been made by H. Houdini on a Voisin.

January 1912 saw the first Associate Fellows listed, with such names as Brewer, Dunne, A. R. Low, Manning, O'Gorman, Handley Page, Horace Short. Nominations were invited for council membership, the Society's offices were to move on February 8 to 11 Adam Street, Adelphi—near the Society of Arts, who had for so long provided the Society's meeting place. An appeal was made for the Pilcher Memorial Fund. In April the annual general meeting was held and there was little discussion although some of the new rules were adjusted. Mr Berriman did say, apropos the library rules, "We cannot have the promiscuous removal of books from the library now we have rooms in which to inspect them. It is very awkward to have the books you want removed from the library and it is therefore proposed that the removal of books from the library shall be subject to regulations. . . ." To which the present writer can add a fervent "hear, hear."

At this time T. O'B. Hubbard was secretary, but in July he was elected a life member, anticipating his departure for the Special Reserve of the Royal Flying Corps; and on August 14 B. G. Cooper, having resigned from the council, became secretary. An announcement in July 1912 was made of examinations for Associate Fellowship in the following March. A subscription list was opened to form, as a memorial, the Wilbur Wright Lecture; £500 had been subscribed at the time of the announcement. Griffith Brewer's obituary of Wilbur Wright was also published. A series of experiments were being conducted at the behest of a research committee at the East London College, and one result was a series of articles on "The Aerodynamic Resistance of Bars, Struts and Wires" by A. P. Thurston. In the correspondence columns was a photograph from Yokohama, of balloons shaped like carp. The accompanying letter suggested that such balloons be towed by piano wire behind aeroplanes for use as targets for artillery practice. The writer followed this up by initiating a discussion on the subject on November 27. On May 21, 1913, Horace Darwin, FRS, delivered the first Wilbur Wright Memorial Lecture on "Scientific Instruments, their Design and Use in Aeronautics." Fellows are first listed as having been elected in the October 1913 journal, when eight names are given, including that of Alec Ogilvie. Cody's obituary appears in the same number.

The annual report of 1914 reported that, owing to the improved finances of the Society, it would be possible to appoint a full-time secretary with salary attached. From 30 applicants, Bertram G. Cooper was selected for two years from February 1, 1914. A total of 105 books had been added to the library, which, it was recommended, should be reorganized as soon as time permitted.

(To be concluded)

WORDS ON THE SKY

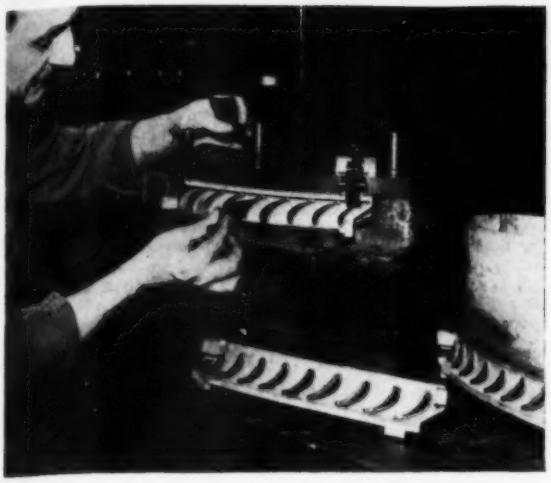
A REVIVAL of sky-writing, seldom seen in this country since pre-war days, has lately been apparent. A new company, Skyscript Ltd, of Colnbrook, Bucks, has been formed for the purpose; they have at their disposal the technical resources of Overseas Aviation (C.I.) Ltd, who have been sky-writing—as well as doing crop-spraying and other specialist flying jobs—on the Continent and elsewhere for several years past.

Skyscript operate four Harvards for sky-writing and a Consul and five Tiger Moths for banner towing. The writing technique is an interesting one, and recently *Flight* learned some of the details from the company's chief pilot, M. V. Rose. The aircraft operate at between 10,000 and 15,000ft, and the weather requirements are stable air and a clear blue sky—or at any rate not more than two-eighths cloud. White smoke is made by injecting a light machine oil—actually Shell Carnea 21—into the exhaust system; coloured smoke is produced by chemical methods which Skyscript regard as a trade secret (they are still experimenting, the problem being to find something that does not quickly fall out and disperse). Each Harvard has tankage in the rear cockpit for 30gal of oil, or a dual supply of perhaps 20gal of oil and 10gal of colour chemical. The pilot has a very precise means of controlling the supply, giving the instantaneous flow or cut-off of smoke that the performance demands, especially if the message is in block letters rather than "handwriting" or when an "i" has to be dotted. Thirty-five to 40 letters can be obtained from one filling.

The pilot positions himself up-wind of his target area and writes across-wind, so that the word drifts over the objective. In order to check what he is writing he must lose height—a few feet are sufficient—after each letter and look backward and up. In general, he forms his letters by counting-off seconds, and for round letters also watches his D.I.; a letter such as "o" will require the Harvard to be held in a steady 60° bank. If a cross-stroke is required—as in crossing an "A"—the aircraft must be flown just under the partly formed letter, otherwise the slipstream will blow it apart. Most people who see sky-writing from the ground find it almost impossible to estimate the length of a word; actually, a ten-letter word will be six or seven miles long.

For the more involved texts two aircraft are employed, and this calls for very close teamwork. Radio, is, of course, used, and a flight plan is always filed with the ATC authorities—who, Mr Rose told us, are invariably co-operative.

Skyscript operate from Southend Airport, where they do their own aircraft maintenance, though for more distant jobs—they have operated as far away as Africa—they position temporarily at a foreign airfield. The scale of charges to advertisers naturally varies in accordance with the density of the "readership." As an example, in South Eastern England the inclusive charge per letter is ten guineas, with a minimum number of ten letters per sortie. For banner-towing £24 an hour is charged; this figure is higher in built-up areas, over which twin-engined aircraft are used.



Seen in this jig is a segment—one of seven—of a Bristol Siddeley Orpheus turbine stator blade ring, with the Nimonic 90 hollow blades being positioned in readiness for welding by British Oxygen Gases' widely used inert-atmosphere Argonarc process

THE INDUSTRY

Warning by Dowty

A PRESS-TO-TEST warning lamp is a recent addition to the range of electrical equipment produced by Dowty Nucleonics' Aircraft Electrics Division at Tewkesbury, Glos. Stated to be equally suitable for industrial or aircraft use, it incorporates facilities for dimming and for lamp-filament checking. Interchangeable with earlier approved types of warning lamps and electro-magnetic indicators, the unit (which is of $1\frac{1}{16}$in overall diameter) can be installed from the front of the panel. When the device is used as a "normally off" warning indicator the lamp filament can be checked by simply pressing the transparent plastic lens, so lighting the lamp through auxiliary contacts. Bulbs, quickly replaceable, are available for 6, 12 or 28V working.

The lamp is available either with or without variable dimming to suit the ambient light, and the adjustment is made by rotating the lens bezel through 90°. Red, green, amber, blue and clear lenses are available.

New Sound-level Meter

CLAIMED to be the first commercial fully transistorized unit of its type in the world, the Type 1400E sound-level meter has been designed by Dawe Instruments Ltd (99 Uxbridge Road, London W5) with the transport industry particularly in mind. Substitution of transistors for valves makes it possible for the instrument to be fully self-contained (including dry batteries) with an overall size of $8\frac{1}{4}$in × $5\frac{1}{2}$in × $3\frac{1}{2}$in and a weight of under 4lb. It can be operated with one hand while the other is used to note readings.

The use of transistors, it is stated, also leads to high stability under a wide range of operating conditions. The Type 1400E meets the proposed IEC specification for sound-level meters; such conformity with basic standards is of course essential in cases of legal action that may eventually arise as the outcome of the current campaign against the noise of vehicles, including aircraft.

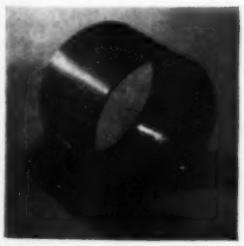
When not in use the microphone is folded down into a recess in the top of the case. When it is raised to the working position the meter is automatically switched on and a reading can be taken immediately, there being no warming-up period for transistors. One set of batteries, it is stated, gives a 60hr operating period. For use in laboratories or test departments, a power unit can be supplied for mains operation.

Apart from a microphone and high-gain amplifier, the instrument incorporates a variable attenuator to give a direct reading of sound level over the range from 24 to 140db. The standard meter therefore covers a range suitable for the majority of applications, except perhaps for measurements in the near vicinity of jet engines, for which a special microphone must be substituted. A further feature is the inclusion of weighting networks to simulate the frequency-response of the human ear.

R. W. Harris

WE regret to record the death, on January 13 at the early age of 53, of R. W. Harris of Aircraft Steel Structures Ltd. In 1946 he joined Bryce Berger Ltd and was largely responsible for their progress as suppliers of diesel-engine injection and starting equipment. He was with them up to the time of their transfer to the Hawker Siddeley Group at Hucclecote. In April 1958, when Aircraft Steel Structures were acquired by Simms Motor & Electronics Corporation Ltd, Mr Harris became director and general manager, a position he held until his death.

IN BRIEF



Increasingly used for domestic and industrial applications, Mhoglas non-metallic heating elements also find aeronautical applications, as in this annular unit designed for warming a fuel-system non-return valve. Missile-component heating is another application. The thermal principle is the use of a conductor consisting of a graphite coating on a glass-fibre base. Hunting Mhoglas Ltd, Craddock Road, Luton, Beds, are the makers

Elliott-Automation Ltd has widened the scope of its interests in control valves by purchasing the business of Black Automatic Controls Ltd, of Corsham, Wilts.

A. V. Edwards, managing director of Ultra Electric (Holdings) Ltd and subsidiaries, has for the past fortnight been in North America in order to visit associates and agents of Ultra Electronics Ltd.

Dagenite aircraft batteries, previously distributed by Peto & Radford, are now being marketed by the manufacturers, Pritchett & Gold and E.P.S. Co Ltd, of 137 Victoria Street, London SW1. The latter company own the Peto & Radford business.

R. B. Young has joined Airtech Ltd as sales manager. Since 1950 he has been with the Plessey Company's Telecommunications and Electronics Division, and before that was with the Radio Division of Standard Telephones & Cables.

An MoA contract for 25 airfield crash tenders has been awarded to the Pyrene Co Ltd. These vehicles, on Alvis Salamander 6×6 chassis and powered by Rolls-Royce eight-cylinder engines, are specially designed for covering difficult ground at speed, and a foam output of over 5,000gal/min for more than 2min is provided by a roof-top monitor and two hose-lines. Pyrene Mk VI crash tenders are already in service with the RAF, RCAF and Royal Ceylon Air Force.

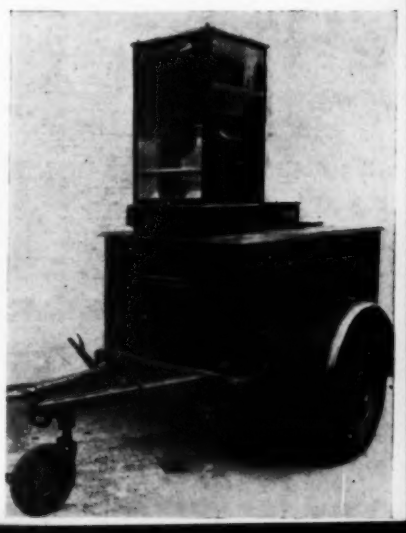
Fafnir Bearing Co Ltd announce that G. Marchant has been appointed general manager of their Wolverhampton and Hednesford factories.

Previously assistant technical manager to Ransome & Marles Bearing Co Ltd, Alan J. Marles, BSC, ACGI, AMIMechE, has been appointed technical manager.

Lewin Road Sweepers Ltd, a company of the Brockhouse Group, are exporting two of their tractor-drawn airfield sweepers to the Fiji Islands—for use on Nandi Airport—and six to Jordan.

V. N. Butler, ARAES, is retiring from the position of chief development engineer at Omes Ltd, the specialists in electrically upset forgings, turbine blade forgings and resistance heating equipment.

Joining Cossor Radar & Electronics Ltd on March 1 to take charge of publicity is John A. Musto, for the past seven years exhibitions and advertising officer with Marconi's Wireless Telegraph Co Ltd.



G.E.C. have completed a contract for 42 airfield mobile beacons of this type for the RAF. The neon light-unit flashes any one or two morse letters selected by switches and the code can be changed while the beacon is operating. Power is generated by a Coventry Victor air-cooled petrol engine and 2½kVA alternator, or, with an auto-transformer, the beacon can be operated from a 250V mains supply. The makers are the General Electric Co Ltd, of Magnet House, London WC2

Correspondence

The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns. Names and addresses of writers, not for publication in detail, must in all cases accompany letters.

Boeing Take-offs

IN his letter in your issue for January 1, G. L. Williams attacks a factual and impartial article by your contributor John Stroud concerning the airfield performance of the Qantas Boeing 707-138.

Mr Williams is clearly under the misapprehension that Qantas operates the Intercontinental version of the Boeing (the 320/420 series) when he says the capacity payload (of the 707-138) "seems to have suffered an immense reduction from the brochure 43,000lb to 30,400lb." The Boeing 707-138 as operated by Qantas is a short-body version of the 707-120 specially tailored to Qantas operations. It has a fuselage length 10ft less than the standard 120, and is roughly 17ft shorter than the Intercontinental 707.

The maximum capacity payload for the 707-138 was correctly quoted by Mr Stroud as being 30,400lb. This has never varied since we ordered the new plane. This payload (limited by fuselage volume) is determined for a high-density seating configuration. With the actual mixed-seating configurations used by Qantas in normal commercial services the volume limited payload is usually less than 30,000lb.

With this correction to Mr Williams' basic assumption, much of his criticism collapses. I would also point out to your correspondent that the "runway length required" on Qantas operations is set, under Australian performance rules, usually by the factored four-engine distance to 50ft. These rules are similar (though not identical) to ARB rules. Consequently the margins on the three-engine distance and accelerate-stop considerably exceed the figures quoted by Mr Williams.

The repeated implication by your correspondent that take-offs where the "distance required" and "distance available" are close are somehow unsafe is to be deplored. The "distance required" is itself a safe standard laid down by our national airworthiness authority, which has achieved a record of safety that is without peer in the world. It is over eight years since there was a passenger fatality on an Australian airline in an accident in which "airworthiness" was even remotely implicated.

The closeness of the runway-required and runway-available figures is simply evidence of the good matching of the aircraft to the route. This excellent matching will undoubtedly appear in the Qantas financial results, which Mr Williams would do well to compare with the achievements of other airlines.

Sydney, NSW — R. R. SHAW,
Technical Development Controller,
Qantas Empire Airways Ltd

Unprofitable Investigation

PROFESSOR LILJEQUIST of Uppsala has announced that he doubts the late Admiral Byrd's claim to have flown over the North Pole on May 9, 1926, and that he intends presently to publish a full account of his findings in order to prove the point.

Is all this toil of investigation really profitable or necessary? So far as I am aware, this is the first time anyone has queried the authenticity of a flight, fully publicized throughout the world, which happened 33½ years ago. Outstanding contemporary airmen-explorers, such as Hubert Wilkins, Roald Amundsen and Lincoln Ellsworth, who were all well acquainted with Byrd, would surely have raised with him any queries or criticisms of the polar flight immediately after it had taken place.

And if it is considered useful and of advantage to the cause of science that the claims of these early pioneers should be scrutinized many years after they occurred, it might be easier to start with Admiral Byrd's first flight over the South Pole, for although Byrd has been dead for over three years, his pilot on that occasion, Bernt Balchen, is still alive and would be able to give evidence.

It is inconceivable that a man of Byrd's calibre, together with his crew, would have deliberately claimed that they had been over either Pole knowing that they had not. Anyone who, in an underpowered fabric contraption of 1926, flew continuously over a wilderness of sea and ice for 15½hr and succeeded in finding his way home was a hero. No one had done that before, and whether the flight passed literally over the Geographical Pole or not is of secondary importance.

London W1 — JOHN GRIERSON

Unbearable

AN advertisement in an American electronics magazine (*Signal*, December 1959) says that certain laboratories are "concerned primarily with work on sophisticated airborne and spaceborne electronics."

In this context "sophisticated" is merely a current gimmick-word, and we may hope for its early demise; but whereas one can be seaborne in a boat, airborne in an aircraft, or chairborne like the writer, nothing can ever be spaceborne. One can't bear this kind of thing, and neither can space.

London SW7 — CLAUD POWELL

Lighter-than-air Luxury

MAY I say how much I enjoyed the article on transport airships in *Flight* of December 25, although I cannot readily accept Peter Brooks' conclusion that "By the time the war was over the long-range aeroplane had so developed . . . that the much slower and, by comparison, operationally unproven rigid airship . . . had had no chance of revival."

I like to think it might be the present trend in aircraft development which would give the airship this chance. It seems that each generation of passenger aeroplane must be bigger and noisier than the last (in an effort to keep up with the Gadarene-Joneses) until now we have the pathetic situation of passengers regimented into rows of six or seven, each clutching his handful of boiled sweets, while piped organ music attempts to drown the jet-engine noise outside. This, the publicity boys tell us with ever bigger advertisements, is Life.

Compare our present-day passenger with any of those shown in your photographs of the spacious rooms of the *Hindenburg* (Rooms, mark you, with tables and chairs and room to walk about. None of your long tube stuffed with rows of seats.) I suppose, though, that it is only reasonable for passenger comfort to decline as aeroplanes become faster. The shorter the journey, the less the passenger will require. One does not expect transcontinental-express comfort on a twopenny bus ride—especially when the operator is striving to reduce the fare to three-ha'pence.

And yet are there not still some individuals who would prefer a "pre-war" standard of comfort with some freedom of movement, though it meant travelling rather more slowly?

Vienna — R. M. CROSS

CORRESPONDENCE IN BRIEF

Flt Lt D. Nursaw appeals to readers who may have served with No 99 Sqn, RAF, for information and photographs (which will be returned on request) concerning the squadron's history. Any who can help are asked to communicate with No 99 Sqn Adjutant, RAF Lyneham, Chippenham, Wilts.

FORTHCOMING EVENTS

Feb. 2. British Interplanetary Society: "The Use of Reinforced Plastics in Rockets," by A. Wilson.
Feb. 2. RAeS: "Suppression of Shock-induced Separations by Boundary Layer Control," by H. H. Pearcey.
Feb. 4. RAeS: Sir Richard Fairey Memorial Lecture (at London Airport Branch), "Naval Aviation," by L. Boddington.
Feb. 5. RAeS Rotorcraft Section: "Helicopter Operations of New York Airways," by R. L. Cummings.
Feb. 6. "Conquest of Space," by Mrs A. Masevich, Royal Festival Hall, London (and at Birmingham on 8th, Bristol on 9th and Manchester on 12th).
Feb. 8. Institute of Transport: Brancker Memorial Lecture, "RAF Transport Command," by Air Chief Marshal Sir Denis Barnett.
Feb. 9. RAeS: "Model Testing in the Aircraft Research Association Co-operative Wind Tunnels," by E. C. Carter.
Feb. 10. British Institution of Radio Engineers (Newcastle-upon-Tyne Branch): "Instrumentation in Rocket Propulsion," by Raymond E. Ross.
Feb. 12. RAeS Agricultural Aviation Group: "Choice of Aerial Vehicle," by N. D. Norman and T. Clutterbuck.
Feb. 16. Photogrammetric Society: "The Re-survey of the Highlands by Photogrammetric Methods," by Maj A. J. D. Halliday.
Feb. 17. RAeS (Main Lecture at Bristol Branch): "Firestreak," by G. H. F. Brown.
Feb. 18. RAeS Astronautics and Guided Flight Section: "Missile Control Problems," by D. Best.
Feb. 19. Institute of Navigation: Discussion on Space Navigation, introduced by Dr J. G. Porter.
Feb. 22. RAeS: Trenchard Memorial Lecture (at Halton Branch), "A Dip into the Future . . .," by Sir George Edwards.
Feb. 23. Institute of Transport (West Middlesex Group): "Aircraft of the Future," by R. C. Morgan.
Feb. 23. British Interplanetary Society: "Some Problems Encountered in the Design of Large Rocket Test Beds," by R. H. B. Forster and L. Breen.
Feb. 23. Guild of Air Pilots and Air Navigators: Banquet.
Feb. 23. RAeS: "Relationship between Theory and Practice in Structural Problems," by A. J. Troughton.
Feb. 24. RAeS Man-powered Aircraft Group: "Natural Flight," by Peter Scott.
Feb. 25. Aerodrome Owners Association: a.g.m. and Annual Dinner.

RAeS Branch Fixtures (to Feb. 5): Feb. 1, *Boscombe Down*, "Long-range Missiles," by E. C. Cornford. Feb. 2, *Luton*, "Development of the Rotodyne," by Dr H. F. Winny.

Getting the feel of being in service is the first DC-8 for SAS, seen here at Santa Monica. It is to be delivered to Stockholm next Sunday, January 31. The second will be delivered in February, the third in March

AIR COMMERCE

SOUTH AMERICAN SERVICE OPENS

FOUR days ago passengers and crew were due to board BOAC Comet 4 G-APDO for the corporation's inaugural flight on the re-opened South American route. The passenger-list included the names of the Minister of Aviation, Duncan Sandys, and BOAC's chairman, Sir Gerard d'Erlanger, setting out to study for themselves the problems, prospects and possibilities of BOAC's service into the hotly contested traffic regions of the America south of the equator. Accompanying them were to be Sir Aubrey Burke, chairman of de Havilland, the chairman of the British Council, Lord Bridges, and the Brazilian ambassador, Senor Chateaubriand. BOAC's chairman, Basil Smallpeice, was joining the flight at Sao Paulo.

Confirmation that Rio will not be available to the Comet (see *Flight* for January 8) is contained in a new timetable issued for this route by BOAC, and which supersedes information published in the current issue of *The ABC World Airways Guide*. Previously, alternate departures were arranged so that the flight leaving on Monday overflew Sao Paulo while the Thursday service flew direct to Lisbon, by-passing Madrid; both were to leave at 6.15 p.m. and arrive at Santiago in the afternoon of the following day, 26hr 15min after leaving London.

The new winter timetable now provides for both services to call at Sao Paulo but not at Rio, and the end-to-end elapsed time has been speeded up by an hour on the service which does not visit Spain. This reduces the difference in elapsed time between the BOAC and Aerolineas Argentinas Comet services over the important London - Buenos Aires sector.

There was some disappointment when BOAC's timetables were first published that the number of stopping points involved (i.e., Sao Paulo and Montevideo, not included on this service by Aerolineas' Comets) meant that the corporation's service from London to Buenos Aires was about an hour and a half slower than that offered by its only jet competitor. (A detailed comparison of journey times was made in *South American Rentrée*, *Flight*, January 8.) Now on one service a week at least the Aerolineas Argentinas advantage has been narrowed to 25 minutes—a differential small enough to be subject to punctuality competition. BOAC appear to be satisfied from their three proving flights that each turn-around can be accomplished in the 45 minutes which both Comet operators now schedule in their timetables. On such details will the corporation's early reputation depend.

DC-8 PERFORMANCE

IN November last year, when *Flight's* "Commercial Aircraft of the World" special issue was being compiled, no performance figures were available from Douglas for the DC-8. It was suggested that this was because Douglas were experimenting with changes to the contour of the engine pylons and the addition of upper-wing vortex generators in an attempt to restore "an unexpected 3-10kt drag penalty."

According to information recently published in *Airlift*, level flight speed of the Pratt & Whitney JT3C-6-powered DC-8s of the type now in Delta and United Air Lines service (at maximum cruise thrust, 220,000lb weight and at 30,000ft) is 469kt, compared to the specification speed of 493kt ±3 per cent. Douglas are reported to be working on a 27-point modification programme to restore some of the lost speed. When the airframe "clean-up" is completed and JT3D-1 turbofans replace the JT3C-6s installed at present, the DC-8 should achieve a speed of 487kt at maximum cruise thrust, i.e. within the original guaranteed figure.

For the speed-recovery programme started last October, Douglas are using the JT4A-3-powered (15,800lb dry thrust) seventh aircraft for testing aerodynamic changes, although in practice it is understood that the loss in speed is more critical on the earlier and less powerful JT3-engined aircraft. The JT4A-3 DC-8 has apparently been demonstrated within 2kt of its specified speed and it is expected that when the 16,800lb dry thrust JT4A-9 is installed (delivery should be made this month) the margin will be further reduced.

The trouble was apparently discovered from flight analysis which showed that drag rise—which starts at Mach 0.8 and becomes critical at Mach 0.84—occurred at a lower Mach number than anticipated by wind tunnel tests. These tests produced drag coefficient figures which Douglas are now trying to restore to the DC-8. Since the junction between pylon and wing is a critical area it is here that much of Douglas' investigation has been concentrated. To reduce drag, DC-8 engine pylons are in any case cambered and the tips inswept over the wing, and as a further drag-reducing measure Douglas are experimenting with the addition of increased fairing either on the inboard face of the pylons or on the leading edge. Another two per cent reduction in drag is expected from the new elliptically shaped tip extension. The modified wing may also have slots, a modified aileron with greater mass balance, and a drooped flap to improve pressure distribution over the wing. When the aerodynamic configuration is finally decided, then vortex generators will be added for an extra improvement.

The brighter side of this picture seems to be that the low-speed performance of the DC-8 is not in question; it is said to be "excellent" and airfield performance better than specified. Douglas say that they do not intend to compromise it in any way by aerodynamic changes made to improve performance at the high Mach number end of the speed range.

NAPIER BUYS CONVAIRS

A FLEET of nine Convair 340s has been bought by Napier from United Air Lines and is to be kept in reserve ready for immediate conversion to Napier Eland power. This is not simply a confident demonstration of faith by Napier in the future of the Eland Convair; they claim their action to be justified by prospects of further "immediate sales in the United States."

These nine aircraft are quite separate from 11 Convair 340s (see *Flight*, December 11, 1959) which have been ordered by Allegheny and of which four are to be converted to Eland power. Details of Allegheny's contract with Napier were settled at Acton on January 18 (see photograph and caption, left). Of the two Convair conversions already in service on the Pittsburgh - Philadelphia run, the converted 440 which Allegheny has leased from Napier and has been operating since July is now to be purchased outright. The other aircraft is N340EL, the first Convair which Napier ever converted and, when it was delivered to Washington, the first aircraft to take off from Luton's new runway.

Operating statistics for the converted Convair 440 (i.e., which then became a Convair 540) show that over the period of the third

An historic date for Napier was January 18, when Allegheny Airline's president Leslie O. Barnes (right) signed with Herbert Sammons, managing director of D. Napier & Son, the contract covering final details of the airline's Eland Convair conversion programme

Lined up at Wisley for an early morning start are four of BEA's Vanguards, one still in its Vickers' colours. Five Vanguards are now flying and the first for TCA will be airborne next month. Seven others are in final assembly

AIR COMMERCE . . .

quarter of last year it produced in Allegheny service an available ton mile cost of 12.59c as compared with the local service airline average for all types of aircraft of 21.14c. Operating cost in the 44-seat configuration was 1.64c per available seat mile and this is claimed to compare with an average of 2.05c for other types of aircraft in US local service. A daily utilization of over six hours was achieved compared with 5½hr for piston-engined Convairs.

The 540s which Allegheny will put into service will be equipped with 52 seats and this should reduce the cost per available seat mile to 1.39c.

THREE BLACK WEEKS

FOUR serious accidents to scheduled airliners in the first three weeks of 1960, causing the loss of 147 passenger lives, prompt the academic question: Will the remainder of 1960, statistically speaking, be relatively safe for air travellers? In other words, has 1960 already had its statistical quota of passenger fatalities?

The best annual world accident rate in ICAO's records, measured in fatalities per 100m scheduled passenger miles (domestic and international), was 0.99 in 1957. Assuming that world scheduled passenger-miles increase by 10 per cent in 1960 compared with 1959 it appears that there would have to be a further 496 statistical fatalities this year for the 1960 accident rate to be as good as the best on record. If traffic goes up by 15 per cent, there would have to be a further 525 statistical fatalities to achieve the same best-ever figure of 0.99.

The "acceptable" yardstick for air transport's fatality rate is usually put at 1.0. In America last year the rate (international services included) rose to 0.7 from 0.4 in 1958. The UK figure (provisional) in 1959 was about 0.95, or zero if inclusive tours are not counted as scheduled services.

This year's first fatal accident, recorded previously, was to a National DC-6B on January 6. Twelve days later, on the night of January 18, Capital Airlines Viscount N-7462 crashed and burnt out in a marshy ravine near Holdcroft, Va; there were no survivors among the 46 passengers and four crew. The Viscount was on its way from Washington to Norfolk, Va, having previously flown from Chicago to Washington. Many airports in eastern Virginia were closed by fog, but Norfolk was still open, with a 600ft ceiling and five-mile visibility. The Viscount was flying IFR and had left Washington at 2145hr. When about 50 miles from Norfolk the pilot had made a routine check with Norfolk tower but at 2220hr, or ten minutes before ETA Norfolk, the Viscount was heard circling several times at a low altitude near Holdcroft, after which it crashed into the ravine.

On the night of January 19 SAS Caravelle OY-KRB *Orm Viking* crashed just before landing at Ankara with the loss of all 35 passengers and seven crew members. This was the first fatal accident involving the Caravelle and it breaks a period of 11½ years during which SAS has enjoyed an unblemished safety record. The airline's president is reported as having suggested that the Caravelle might have been flying too low and hit a hill. *Orm Viking* had left Copenhagen for Cairo and called at Dusseldorf, Vienna and Istanbul, where the crew changed. Reports indicate that the Caravelle, flying at about 2,000ft in an overcast, rainy sky, suddenly lost height on the approach and crashed into a hill.

On January 21 Avianca Super Constellation HK-177 was destroyed in a landing accident at Montego Bay, Jamaica, and 37 people lost their lives; four passengers and five crew members survived. According to eye-witnesses, the Super Constellation bounced twice on the runway, then one engine caught fire. The aircraft spun round twice, skidded some distance and finished up in a swamp, splitting down the centre as explosions occurred. Pieces of wreckage were found up to 300yd away. The Super Constellation was on its way from New York to Bogota and had made an unscheduled stop at Miami for an engine fault to be rectified; later it had to return there for further attention.

It is said that 1960 has so far cost the London insurance market more than £4m for hulls alone, with a further liability—as yet unassessed—for passenger claims. A London insurance firm's spokesman is reported to have said: "The London market thrives on adversity, for it advertises London's ability to pay up."

THE GREAT SAHARA BLANKET

AN area of prohibited airspace three times the size of France is to shroud the Sahara region in which the French atomic bomb is to be exploded. It was first to come into force at 0545 GMT on January 22, but before the great Sahara blanket was due to close off airspace over a substantial part of the desert around the permanently prohibited area that surrounds the town of Reggane, the notice was withdrawn.

Those who had been following statements by the French Ministry of Defence on the subject of the Sahara atomic test area were not unduly surprised by this apparently sudden withdrawal: it was announced earlier in January that the areas around Reggane would be subject in the coming months to "exercises" involving flight restrictions, and from this it was surmised that distinction might not be made between exercises and the blocking-off that is to be put into effect when the actual explosion is imminent.

Around Reggane itself flying was permanently prohibited to all aircraft except those of French nationality from December 31, and the latter are confined to a narrow corridor that passes through the edge of the permanently prohibited Zone 42. Surrounding the latter are two areas in which movements are prohibited over stipulated periods; a Blue area extending from ground level to 3,000 metres and a much larger Green area extending from 3,000 metres amsl upwards to an unlimited height. A Notam governing this restricted airspace warns that at least 12 hours' notice will be given before "H hour," the time at which prohibition in these regions becomes effective. Automatic closure for six hours will follow in the Blue area and for 12 hours for the Green, and no air

Before delivery to Skyways of four ex-BOAC Constellations the corporation is modifying three of them to include this large freight door with inset passenger entrance. Note the reinforcing strake along the lower sill

Visiting A. V. Roe at Chadderton recently to discuss the Avro 748 were Capt L. B. Greensted (left) and H. B. Cundall, respectively Hunting-Clan's operations director and chief development engineer. They are pictured here with E. S. Greenwood and also E. Galitzine of Hawker Siddeley

transport or other movements will be permitted during these times.

Most aircraft crossing the Sahara follow Advisory Direct Routes 446 to Niamey—through the Blue area—or ADR 251 to Kano through the Green. Among the latter are BOAC, who say that "there should not be much dislocation" and that they will probably change their times of service to avoid overflying the Green area during the periods that it is closed. Failing this, they would expect to re-route aircraft as it became necessary.

GROUND ENGINEERS' GUIDE

JUST issued by the Air Registration Board is a new section L of British Civil Airworthiness Requirements which deals with licensing and the duties of maintenance engineers. Along with it are reissued two important notices to licensed engineers and to owners of civil aircraft: No 3, dealing with the overlap of engineers' responsibility; and No 10, *Ratings of Categories of Aircraft Maintenance Engineers' Licences*. Contained in the latter is notice of the Board's intention to withdraw from holders of appropriate ratings in category "X" authority to certificate overhauled equipment: from June 30, 1960 this work will come under the authority of approved inspection organizations.

"STRONG AND UNMISTAKABLE SIGNS"

THERE will, after all, be another IATA traffic conference. The Honolulu conference last October was not the first in the turbulent history of these meetings to break up in disagreement, but it was the first to break up in the knowledge that unless there were "strong and unmistakable" signs of a settlement (Sir William Hildred's words at the time) there would be no further meeting. There would, indeed, be an open rate on all routes except intra-European and between North and South America. The prospect has evidently been too much for most airlines, and in any case, the root cause of the disagreement—BOAC's desire for the extension of economy class—has been removed by HMG's approval of BOAC's plan to introduce economy fares on British cabotage routes. (BOAC want to do this from April 1.)

No date or place for the meeting has been announced, but one of the delegates' first decisions will be to extend present fares and standards for a period of 30 to 60 days from March 31, when present agreements in the "unresolved areas" expire.

Not only price chaos is feared by the airlines: no agreement was reached at Honolulu on such thorny questions as jet seating densities and sleeping berths. Though most operators did not want berths, some wanted first-class seating to be four-abreast at 40in, with no foot rests; others wanted it to be five-abreast at 42in *with* foot rests ("sleeper seats"); others wanted it to be something else, with or without a "de luxe" surcharge for the ability to put your feet up.

The question of sleeping berths is particularly delicate: most big jet operators say that jet speeds render berths pointless on North Atlantic routes, yet these airlines do not want propeller competitors to have facilities for putting passengers up for the night. And so it goes on, with a regulation required to cover every quality-competition loophole.

BOAC, of course, have two "misfit" aircraft in the big jet arena—the Comet 4 and the Britannia—and to attract passengers to these aircraft the corporation will no doubt seek special concessions for them—such as berths in the Britannia or de luxe service and 52in-pitch sleeper seats at first-class fares in the Comet 4. In theory BOAC could quite easily be as much of a nuisance on standards as they were on fares.

On one thing all the airlines are agreed—the North Atlantic jet surcharge is to go on February 29. It remains to be seen whether a propeller discount will take its place. Almost certainly, too, tourist class will disappear from the North Atlantic route.

BATTLE OF THE BAHAMAS

THE brief note under the above heading in *Flight* last week can now be amplified. Behind the short announcement that President Eisenhower has approved the applications of two British independents to operate scheduled services from the Bahamas to Florida—one of the world's richest air traffic markets—lies a fascinating story of independent airline rivalry and US-UK political air transport competition.

There are two British airlines registered in the Bahamas, each of them related to a UK independent. One is Bahamas Airways, in which Eric Rylands of Skyways, London, has a substantial interest. The other is Eagle Airways (Bahamas) Ltd, an associate of Eagle Airways, London, and a Colonial sister of Eagle Airways (Bermuda) Ltd.

Bahamas Airways used to be a wholly owned subsidiary of BOAC. In 1958 one of the first actions of the newly formed BOAC Associated Companies was to dispose of 80 per cent of its shareholding, this being taken up jointly by Eric Rylands and David Brown. The corporation retained a 20 per cent interest, the new arrangement becoming effective from April 1, 1959. Bahamas Airways had not been doing too well, having lost £90,000 on a revenue of £268,000 in 1958-59. But its prospects for development were considered to be good.

Among the services which for seven or eight years had been operated by Bahamas Airways on BOAC's US foreign carrier permit were those between Florida and the Bahamas, whose beautiful islands are highly favoured by the many American holidaymakers in Florida who like to make the "sidetrip" to the islands. The routes concerned are defined by the UK-US Bermuda Air Agreement as "Route 6," and UK airlines enjoy the right to operate from points in the Bahamas to Miami, Palm Beach, Fort Lauderdale and Tampa with Havana as an intermediate point.

Unfortunately, Bahamas Airways' DC-3 operation came under a "cease and desist" order from the CAB about two months ago, as a result of an American legal quibble about the airline's rights to operate on BOAC's foreign carrier permit. There had never actually been a written agreement between Bahamas Airways and BOAC on this point. But when the majority ownership of Bahamas Airways passed out of BOAC's hands the new Bahamas Airways applied to the CAB for its own foreign carrier permit. At the same time, BOAC made it clear that they did not want to surrender the permit granted in *their* name. (Obviously, the day may come when BOAC will want to re-enter Florida.)

The next move was the Bahamas Government's approval of an

Competitors soon to operate into the rich Miami market (see text) are Bahamas Airways' 76-seat Hermes 4s—two ex-Skyways aircraft luxuriously fitted out—and Eagle Airways Bahamas' Viscounts. This one (right), an 800, was recently swapped for two Aer Lingus V.700s, in which Eagle will seat up to 63 on the short Bahamas - Florida run. For this new operation they will be chartered from Eagle Airways Bermuda

Now a familiar sight at London Airport, which is the setting for this characteristic loading scene, the Caravelle has recently entered service with Varig, SAS and Air Algérie. It is to enter Swissair service (under lease from SAS) in May

AIR COMMERCE . . .

application from Eagle Airways (Bahamas) Ltd (registered in the spring of 1959) to operate between the Bahamas and Florida. Evidently Eagle sensed that the Bahamas wanted a first-class operation to be flown by a British carrier—it being suggested that Bahamas Airways intended only to operate DC-3s at discount fares. (Bahamas Airways contest this: they say that it had always been their intention to operate Hermes 4s, and that these aircraft were not specified as a counter to Eagle's proposed Viscount service.) However, Eagle also then formally applied to the CAB for the necessary foreign carrier permit.

The applications of both British independents were hotly contested by Mackey Airlines, who operate DC-4 services linking Tampa, Fort Lauderdale, Palm Beach and Miami with Nassau. No objection was filed by Pan American who operate DC-6Bs (and quite recently a twice weekly 707) from Miami to Nassau.

However, the fact is that President Eisenhower has now approved the CAB's recommendation that both Bahamas Airways *and* Eagle Airways (Bahamas) be granted a foreign carrier permit for Route 6. But Bahamas Airways get more than Eagle: they have been granted a permit to operate services to all the points designated in Route 6 of the UK-US air agreement. Eagle have got a permit to operate only to Miami; "oral argument" before the CAB will decide their claims to Palm Beach, Fort Lauderdale and Tampa. But Eagle have also applied to operate from Nassau to Jacksonville and Atlanta, and from Nassau to Chicago—"deeper penetration" routes into the US which are not designated in the UK-US air agreement. Whether or not Eagle will be designated for these routes as a result of the forthcoming UK-US talks in Barbados remains to be seen. It is an application that is certainly warmly approved of by the Bahamas Government.

Meanwhile Eagle Airways are all set to begin services to Miami and Havana from Nassau as from March 1. The aircraft to be used are Viscount 707s chartered from Eagle Airways Bermuda. These two Viscounts, as reported last week, were recently exchanged with Aer Lingus for Eagle's one remaining Viscount 805. The first aircraft was delivered to Bermuda last week and the second is due to follow on February 17, both having been re-worked by Eagle Aircraft Services.

Bahamas Airways are likewise all set to introduce their luxuriously appointed Hermes 4s as from next Monday, February 1, on the routes from Nassau to Miami, Fort Lauderdale and West Palm Beach. DC-3s (32 seats at 39in pitch) will operate the shorter sectors from Grand Bahama Island to West Palm Beach and from Bimini to Miami—in addition, of course, to the big network of domestic Bahamas routes. But the main routes will be operated by the Hermes.

So here we have two British independents, or more correctly their relations in the Colonies, keenly competing for business in one of the richest air traffic areas in the world. The potential air traffic market between Florida and the Bahamas is enormous. The president of Eagle Airways (Bermuda), Harold Graham, has told *Flight* that the forthcoming boom in the Bahamas will be "the most sensational in the Caribbean." Last year Pan American increased their business between Miami and Nassau by 76.5 per cent compared with 1958, carrying 44,745 passengers; Mackey increased their business by 62.9 per cent carrying 23,660 passengers. The Bahamas were visited by 115,000 American tourists in 1959, five times the number of visitors in 1949.

And an interesting pointer to the future is that Miami's residential population, which lives almost entirely off tourism, is said to be increasing by no less than 1,000 residents per week. Eric Rylands, who with David Brown owns 80 per cent of Bahamas Airways, has told *Flight* that his airline's inter-island traffic increased by nearly 70 per cent in the first nine months of the "new" Bahamas Airways—an indication of the increasing popularity of the resort islands. He considers this a significant pointer to the future of the Bahamas, which as a tourist resort "will eventually become an extension of Florida." J.M.R.

WILL DOUGLAS BUILD CARAVELLES?

IT now seems likely that the Sud Caravelle will be licence-manufactured in the US—not by Republic, who were once a contender—but by either Douglas or Convair. Teams from both companies separately went to Toulouse last month, and Sud engineers have been to both Santa Monica and San Diego. Whichever company decides to go ahead, the US-built Caravelle would be powered by GE CJ-805-23 aft-fan engines. General Electric has confirmed an order for a Caravelle; this will be delivered in July, and GE will undertake the conversion and FAA certification tests (the French jet is FAA-certificated with Avon RA.29s).

It seems that the DC-9 is not going to be built after all: provisional data were issued last summer, but No 1 potential customer—United Air Lines—did not bite. It is UAL, the world's biggest airline, who are in the market for a short-range jet. Mr Patterson, never hitherto a pioneer purchaser of turbine equipment, is now setting the US domestic pace in this particular jet field. As long ago as January 1958 he said United was in the market for 40 short-range jets.

US production of the Caravelle, for delivery in 1961, would be a reverse for the Boeing 727's prospects, and it could affect also the Airco DH 121's big potential US domestic market. A UAL order could precipitate an immediate round of buying from competing airlines. The question would be "Caravelles in 1961? Or 121s two years later?" No statement on the Boeing 727, which is now a three-engines-aft design like the 121, is yet forthcoming: a correspondent reports that the powerplant would be Allison-built Rolls-Royce RB.163s, designated ARB.963, with an additional compressor-stage.

BEA'S 2,000 PER CENT PROFIT INCREASE

QUITE the most cheerful statistic ever to be published by a Corporation is contained in a recent statement by BEA to the effect that profit in 1959 was 2,000 per cent up on that achieved in the 1958 calendar year; it amounted to about £2 million.

Writing of the airline's successful 1959 the airline's chairman, Lord Douglas, said:

"I expected a year ago that we would carry over three million passengers during 1959. In the event—and thanks, in important measure, to the new low inclusive tour fares which we introduced in 1959—we carried 3,200,000 passengers while passenger-miles rose 18 per cent to 1,130 millions.

"Still more satisfactory was the increase in our freight business—traffic was up by no less than 24 per cent to 13,850,000 ton-miles. Our traffic as a whole increased by 19 per cent to 126 million ton miles. . . .

"Whereas in the 1958 calendar year we made a profit of rather less than £100,000, preliminary indications are that we made a profit, after paying all interest charges, of about £2,000,000 in the 12 months ending in December. This is a tremendous achievement on BEA's short-haul and highly seasonal network and something of which the whole Corporation can be proud."

A summary of results shows that while c.t-m. increased by 7.1 per cent, l.t-m. sold were up by 19.1 per cent, and that revenue load factor was up sharply from 60.1 per cent to 66.8 per cent. And although the average number of staff employed crept up by 4.6 per cent to 12,008, c.t-m. per employee rose by 2.6 per cent to a new high level of 15,800.

TROUBLE ON THE FLIGHT DECK

ACCORDING to a report in *Aviation Daily*, a special panel set up to try to decide whether flight engineers should continue to be employed by United Air Lines has run into difficulties. A motion has been passed by the Flight Engineers' Association demanding that the chairman, J. Glen Donaldson, should disqualify himself from the panel because, they say, he had witnessed a "rigged" demonstration of a DC-7 crew operation during a flight to his home at Denver.

Later the Engineers' Association made public a report by the flight engineer on that flight in which he said that he was ordered not to perform certain functions he normally performs and to perform certain others he does not often perform. During the flight, an easy one in daylight and clear weather, the engineer said he was ordered not to record engine performance data but to assume certain piloting and navigation duties. He was, he said, under the command of Capt Warren Le Roy, who is vice-chairman of the pilots' Master Executive Council of United Air Lines.

The chairman of the panel on flight engineers has refused to accept the engineers' demand for disqualification with the reply that "Le Roy asked me if I wanted to ride in the cockpit . . . I knew both sides would be represented . . . the flight engineer was my principal source of information."

MEA PICKS UP

A STRONG recovery has been made by Middle East Airlines after their crisis year of 1958 and has brought favourable financial results to this BOAC associate. At the end of the year the airline was able to report that it had carried 148,000 passengers—42 per cent more than the number carried in 1958—and that revenue was about £4m. This was 62 per cent greater than that achieved in the pre-crisis year of 1957 and was achieved at a time when the airline offered a substantial increase in the capacity previously offered. In a comment on these figures the chairman and managing director of MEA, Sheikh Najib Alamuddin, was thus able to say that his airline increased traffic more than capacity and was expected to be able to show "a satisfactory profit" over the year.

BREVITIES

Gilbert H. Lee, chief commercial manager of BOAC, has been appointed the corporation's commercial director.

East African Airways' traffic increased by 11 per cent during 1959 and the airline carried 130,400 passengers, 96,500 on domestic services.

A. H. Milward, chief executive of BEA, is to tour Africa in February to investigate the bush routes of African domestic operators. This is a follow-up to his tour last year of Canada and Australia.

Changes are to be made in the timetable of many flights on the Sabena network to provide more appropriate connections to services now operated by the airline's Boeing 707s.

Convair 340s figure in an application to the ATAC by Dan-Air, who are applying to use them on a thrice-weekly service between Bristol and Liverpool and between Bristol and Basle.

The car ferry service between Liverpool and Dublin proposed by BKS is to start operations on April 25. The airline estimates that some 3,000 cars and 12,000 passengers should be carried between April and October.

The first Caravelle for Air Algerie was accepted by the president and general manager of the airline, M Jean Richard-Deshais, at Toulouse on January 6. The aircraft entered service on the route between Algiers and Paris on January 12.

M. D. (Tim) Morrissey, at present BOAC sales manager UK and Europe, has been appointed general sales manager for the Corporation. He will be responsible for co-ordinating policy

An FAA civil aviation assistance group has been established in Cairo to provide technical assistance to the UAR. This will be a co-operative effort to install and operate airways and air traffic control suitable for jet aircraft. An expenditure of up to $5 million is envisaged on radar approach control at Cairo, ILS, VOR and approach lighting systems.

Full normal category approval for civil operation has been given by the ARB to the Rolls-Royce Avon RA.29 Stage 6, Mk 531. Average thrust is 12,500lb and minimum guaranteed thrust 12,200lb. The RA.29 Stage 6 powers the Caravelle 6 and deliveries of these engines are to begin in the summer.

Lockheed say that development of the Super Hercules—held up by Allison's lack of funds for the T61—is continuing as scheduled and that progress of the Rolls-Royce Tyne engine during the period of development has shown it to be "very compatible both in performance and availability to proposed Super Hercules delivery schedules."

According to the FAA administrator, E. R. Quesada, during 1959 the US carriers' fatality rate rose from 0.4 to 0.7 per 100 million passenger miles. This is about the same level as that achieved in 1956 but significantly above the figure for 1957 and 1958. The US rate of car and taxi fatalities, for comparison, has been more than 2.0 per 100m passenger miles over the past decade.

Although the first of three Swissair DC-8s is to be handed over at the beginning of March, it will remain in California (where weather conditions are better) for pilot training until early April. Subsequently all will undergo a modification programme in Stockholm before entering service from the beginning of May. The first of the airline's four Caravelles (leased from SAS) will go into service in the same month.

Aeroflot is contemplating the inauguration of a passenger helicopter service between the city centre and Moscow Airport.

PanAm carried 354,130 passengers across the Atlantic in 1959, 17.3 per cent more than were carried in 1958.

Another airline which experienced a record year in 1959 was Swissair, which claims to have made a profit of about £2,500,000 on a revenue of £22,500,000.

The initial traffic programme of the new Thai Airways includes a daily service between Bangkok and Hong Kong and three flights weekly to Tokyo.

It appears from the Irish Civil Air Register that Irish Airlines may be considering taking an option on two further Boeing 720s, two registrations having been "reserved for Aerlinte."

Compulsory implementation of the FAA rule demanding that all US transports should be equipped with weather radar will not now come into force for two years.

All Japan Air Lines' fleet of five DC-8s will be powered by Pratt and Whitney JT4A-9A engines. The airline is paying $6,250,000 for the recently ordered fifth aircraft.

Mackey Airlines have leased a DC-6 from Frederick B. Ayer and Associates for a two-year period, and taken an option on two more. The airline will pay Ayer $10,000 a month.

Approval by the Government of India has finally been given to Air-India's proposed purchase of a fourth Boeing 707. It is likely to be delivered early in 1961.

It is reported that a working group on Cyprus which met in London recently approved the construction of a new terminal at Nicosia Airport. The cost of about £500,000 would be met by the UK.

The Russians last week confirmed that "an Ilyushin airliner" with 27 passengers and a crew of five on board crashed on December 13 last on a flight from Kabul, Afghanistan, to Tashkent. There were no survivors. Three West Germans were among those on board.

According to a report in *Aviation Daily*, Lockheed Aircraft are still discussing with the Indian Government the construction of a Lockheed-designed twin-Dart transport to be built under licence in India. It would carry 42 passengers. The Indian Government has already contracted to build the Avro 748.

The Council of the Air Registration Board has issued the following notices to licensed aircraft engineers and to owners of civil aircraft: No 3, issue 4, January 1, 1960; No 4, issue 25, January 1, 1960; No 7, issue 23, January 1, 1960; No 10, issue 9, January 1, 1960; No 42, issue 4, January 1, 1960.

J. R. McGowen, vice-president commercial programmes at Douglas, said recently that he anticipated that increased traffic during the next two years would create a demand for more than 30 additional jet transports in the DC-8 category. Of the introduction of a short- to medium-range turbojet he said that this remained "a subject of study and discussion with airline operators" (see previous page).

Continued Derby Aviation interest in the Dart Herald is indicated by an application to the ATAC to use this type and Viscounts on the route from Manchester, Derby or Birmingham to Lisbon and Madeira. Another interesting application comes from Orion Airways, who are applying to operate services from Coventry to Valley, Dublin, Caen, Belfast and Marseilles as soon as the new runway at Coventry is completed. Until then they are applying to operate from Birmingham.

A $1,000 "civil penalty" has been levied by the FAA against a US airline captain, Clyde H. Proper, for refusal to permit an FAA inspector to conduct an official *en route* inspection in "defiant disregard of the public interest." The airline concerned said later that the action of the captain "was a personal determination of his own responsibility. It was unsanctioned and unauthorized." The captain has refused to pay and the case is being referred to the US Department of Justice.

A Meteor PR.10 of No 81 Sqn, which recently completed its 10,000th reconnaissance and photographic operation in the Far East (this page, last week), in flight over Malaya

SERVICE AVIATION

Royal Air Forces and Naval Flying News

Future Perspective

HAVING been CAS in the 1950s, Marshal of the RAF Sir Dermot Boyle has taken a look into the 1960s in an article in the current issue of *Air Power*. He says that Bluestreak is now in an advanced stage of development and due to enter service in the mid-sixties as a complementary weapon to the V-bombers, and comments that "there would clearly be advantages" if the deterrent could continue to be composed of manned aircraft and ballistic missiles. Characteristics invaluable in "a new manned vehicle" would be VTOL capacity and long endurance; but it would not necessarily have to fly at great speed. Referring to the Lightning, Sir Dermot says that its future equipment will include a collision course weapon. The TSR.2, for a flying radius of action of 1,000 miles, will require only 1,000yd of runway, and for a 600-mile radius will get off the ground within 600yd. It is to have all the latest radar aids and its speed "will be in the region of M2."

Malta-based Reconnaissance

WHEN Sir Dermot Boyle visited Malta during one of his flying tours as CAS, a Canberra of No 39 Sqn recorded his arrival photographically and 22min after his touch-down Sir Dermot received a print from the squadron commander, Wg Cdr R. L. Wade. This example of No 39 Squadron's work was given recently by the headquarters of Allied Forces Southern Europe, in which the squadron is the only British unit. Its role is described as "pre-strike reconnaissance in support of the Supreme Allied Commander Europe's nuclear retaliation to aggression," and it is under the direct operational control of the Sixth Allied Tactical Air Force, a subordinate command of Allied Air Forces Southern Europe. The squadron's aircraft carry a fan of six F.52 36-inch focal length cameras; sorties are made at a few minutes' notice to destinations as far from Malta as Kenya and the United Kingdom.

Technical Training Post

ON Monday this week Air Cdre B. A. Chacksfield took up a new appointment as Senior Air Staff Officer at Technical Training Command, with the acting rank of air vice-marshal. His last post, before taking the 1959 course at the Imperial Defence College, was that of Director of Guided Weapons at the Ministry of Supply. An ex-apprentice, AVM Chacksfield was mentioned in despatches four times during the war and in 1945 made an OBE. He is also AFRAeS.

Forty Years Up

A PARTY in a Hastings aircraft above Cyprus on Monday will mark for No 70 Sqn forty years' continuous operations in the Middle East. The squadron, which is now commanded by Wg Cdr P. Ainley, was re-formed at Heliopolis, near Cairo, on February 1, 1920, with bomber aircraft, having been a fighter unit on the Western Front in the First World War. Among its early achievements was participation by its Victorias from December 1928 to February 1929 in the first airlift in the history of aviation, when nearly 600 people were evacuated from Kabul during inter-tribal disorders in Afghanistan. During the Second World War the squadron was engaged on bombing operations with Wellingtons, and subsequently Liberators, in the Middle East and Italian theatres. It reverted to the transport role in 1948, playing a major part in post-war Middle East operations. The squadron received a standard in 1955.

Ex-Apprentice STSO

FORMERLY Senior Technical Staff Officer at No 3 Group, Bomber Command, Gp Capt J. C. Pope has been appointed Senior Technical Staff Officer at Flying Training Command. He joined the RAF in 1928 as an apprentice and won a cadetship to Cranwell, from which he was commissioned four years later. After flying in India with Nos 27 and 39 Sqns he took a specialist engineering course in 1937 and in 1940 transferred to the technical branch. One of his wartime appointments was that of Senior Technical Staff Officer at Middle East headquarters. He was made a CBE last year.

IN BRIEF

A Sea Vixen piloted by Lt Cdr M. H. J. Petrie, CO of No 892 Sqn, flew from Yeovilton to Malta in 2½ hr on January 21.

* * *

No XV Sqn, whose Victors participated in last year's "Golden Flight" Air Day at Toronto, have been presented with a totem pole by their Canadian hosts. Carved by Chief Mathias Joe of the Capilano tribe of Red Indians, it has come to Cottesmore as a gift from the RCAF base at Sea Island, Vancouver.

* * *

Aircraft of the RAF, FAA, Indian Fleet Air Arm, IAF, Pakistan Air Force and Royal Ceylon Air Force are to have reconnaissance, strike, AS and transport roles in Jet 60, the annual Commonwealth maritime exercise period in the Far East, which begins next Monday (February 1) and continues until February 29.

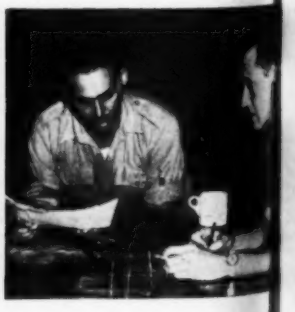
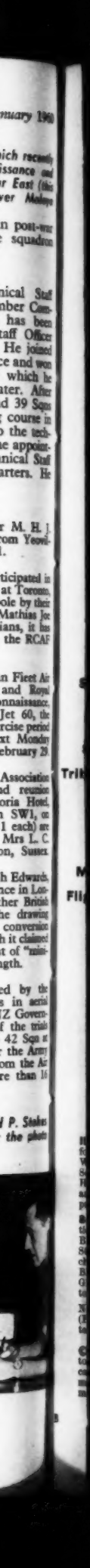
* * *

The 38 Group Old Comrades Association 14th annual general meeting and reunion dinner is being held at the Victoria Hotel, Buckingham Palace Road, London SW1, on March 12, at 6.30 p.m. Tickets (£1 each) are obtainable from the hon secretary, Mrs L. C. Rendall, Hotel Metropole, Brighton, Sussex.

* * *

It was stated by Admiral Sir Ralph Edwards, chairman of a Navy League conference in London recently, that designs for another British aircraft carrier "are already on the drawing board." The League included the conversion of a second Commando carrier, which it claimed could be available next year, in a list of "minimum requirements" for Naval strength.

* * *

Three Grumman Avengers used by the RNZAF for post-war experiments in aerial topdressing are being sold by the NZ Government Stores Board. At the end of the trials the Avengers were returned to No 42 Sqn at Ohakea for target-towing duties for the Army and Navy. They were "retired" from the Air Force in June last year, after more than 16 years' service.

No 39 Sqn, the only British unit assigned to Allied Forces Southern Europe (see item above), at work: Flt Lts P. Cockman (left) and P. Stokes enter their Canberra PR.3 for a sortie; Wg Cdr R. L. Wade, the squadron commander, in his office; and Flt Lt A. Chalker, i/c the photo interpretation section, with Flt Sgt R. Worthing